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Tumor Surgery of the Head and Neck

By ROBERT S. POLLACK, M.D., F.A.C.S.

Clinical Instructor in Surgery, Stanford University School of Medicine; Clinical Instructor in Surgery (Oncology), University of California School of Medicine; Assistant Chief of Surgery, Mount Zion Hospital, San Francisco, California

THIS common-sense approach to a difficult subject bridges the gap between general, plastic, ear, nose and throat, and oral surgery—and radiation therapy. Completely clinical throughout, the book covers a field which borders on all of these specialties but which is emphasized by none. It can truly be considered *the art of head and neck surgery.*

In concise terms, Dr. Pollack clarifies many of the diagnostic problems encountered in practice. This simplifies the decision of what method of therapy to employ. A considerable part of the text deals with technic and in every instance the author details his reasons for the recommendations made.

Each operative procedure of head and neck tumors is accompanied by a detailed discussion of indications. This is followed by the clearly presented methods of technic supplemented with a virtual atlas of step-by-step illustrations showing precisely what to do and how to do it. Many of the technics result in a less drastic sacrifice of the cosmetic problem, yet allow for the best possible result in terms of cure. Ample bibliographies accompany each operative procedure. The importance of methodology in the surgical treatment of tumors of this anatomical area is stressed. Recurrent cancer, the use of isotopes, chemotherapy and the basic concepts of pre- and postoperative care are included in separate chapters.

Much of the material in this book has served as a background for the author's teaching activities and has been proved successful in clinical and private practice. Surgeons, surgical residents, eye, ear, nose and throat men, plastic and oral surgeons, internists, and therapeutic radiologists will find this book an excellent guide to the important steps and operations available in treating tumors of the head and neck.

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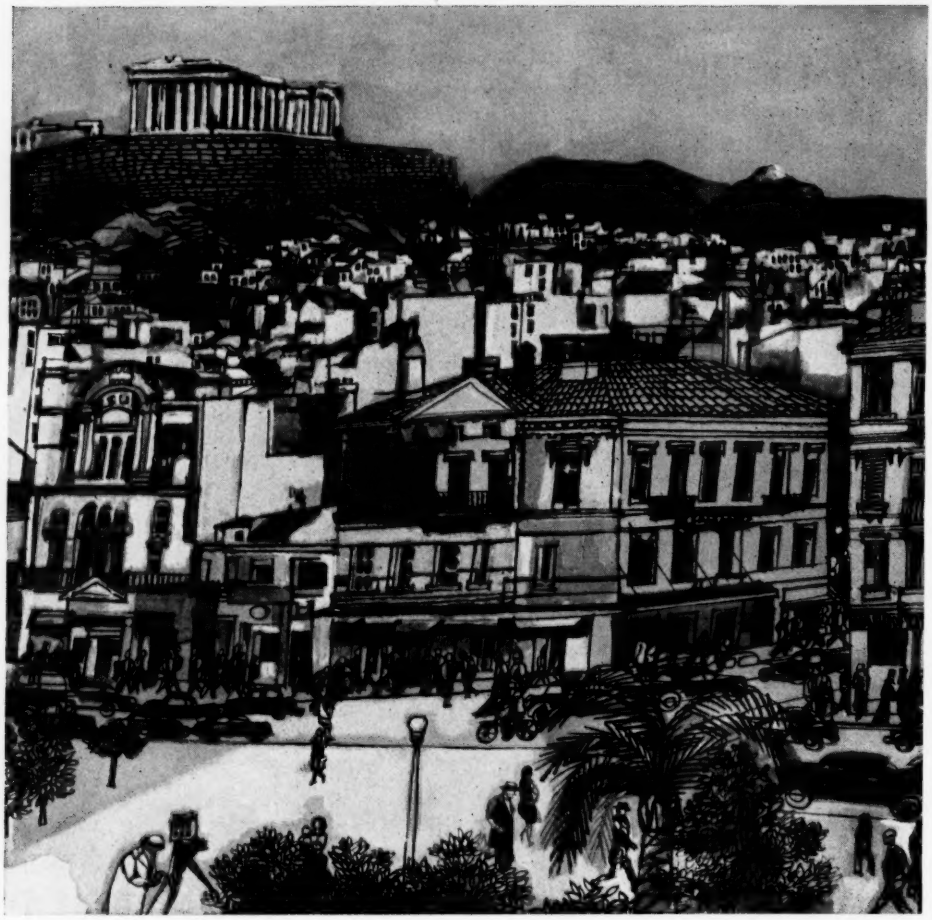

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Plastic and Reconstructive Surgery

A Practical Approach to Problems of the Temporomandibular Joint

PAUL P. PICKERING, M.D., D.D.S., F.A.C.S., F.I.C.S., D.A.B.

AND

LAWRENCE T. MOORE, D.M.D., M.D.

SAN DIEGO, CALIFORNIA

DERANGEMENT of the temporomandibular joint and the associated symptoms have been subjected to inquiry by many clinicians and investigators. It is the intent of this presentation to clarify the problem and to present a reasonable approach to the diagnosis and treatment.

The temporomandibular joint is similar to any other joint in the body in that it may be affected by tumors, degenerative osseous diseases, infections and trauma.[1] This joint, however, has peculiar anatomic and functional physiologic features. It is both a hinge joint and a gliding joint, with some of the characteristics of each; consequently, it is complex from an anatomic standpoint.

The temporomandibular joint problem is quite prevalent and unfortunately is ignored in many instances, since the symptoms are sometimes bizarre and irregular.

It is encountered most commonly in the female, in the third and fourth decades of life.

The pathologic process and resulting

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symptoms due to internal derangement of this joint present the more complex problems. The general systemic conditions that affect the joint are of lesser frequency and importance. These will be discussed briefly for completeness.

Anatomic Background.—The temporomandibular joint is a complex joint, combining a hingelike motion, a forward gliding movement and lateral excursion. The condyle of the mandible rests in the glenoid fossa of the temporal bone. There are two separate synovial cavities on each side of a fibrocartilaginous meniscus. This meniscus, or disk, is held in position by a dense fibrous connective tissue capsule (Fig. 1), which extends completely around the joint and maintains the condyle in the glenoid fossa. It is attached to the zygoma and to the temporal bone and extends onto the neck of the condyle. The joint is further supported by the stylomandibular ligament on its posterior surface and the sphenomandibular ligament on its medial surface. It is attached laterally by the short, dense temporomandibular ligament. The movements of the temporomandibular joint are effected by utilizing different portions of the complex joint structure.

The hinge movement occurs in the lower compartment, between the condyle and the meniscus. The gliding movement, around the wide arc, involves the condyle and the disk together. This function is in the upper compartment.[2] The articular disk has been erroneously described as thin in the center and thick in the posterior dimension. It is actually thickest in the center and in the anterior dimension and has a thin posterior dimension.[3] The synovial cavities are lined by thin connective tissue continuing from the fibrocartilage that also covers the fossa.

Causes of Temporomandibular Joint Malfunction. — Systemic Diseases: Systemic diseases may affect the joint in the same manner they affect other joints in the body. For example, rheumatoid arthritis may affect the temporomandibular joint and may range from a mild disturbance to complete ankylosis. If this occurs in the first decade of life, it seriously inhibits the growth of the mandible.

The joint may be affected by osteoarthritis. This disease usually affects the bone directly, rather than the synovial membrane or the capsule. It is a degenerative condition that results in limitation of movement of the joint.

Acute suppurative diseases affect the temporomandibular joint as they affect any other joint. Suppurative aural or oral lesions may invade the mandibular articulation by direct continuity. Typhoid fever, scarlet fever, pneumonia, influenza and measles are occasional factors in acute arthritis of this joint.

Developmental abnormalities are usually obvious upon direct observation or by simple roentgen examination.

Internal Derangement: The most difficult problems arise in this category. The symptoms may range from very mild discomfort to almost complete incapacitation of the patient.

These intrinsic problems of the temporomandibular joint may be the result of one or more etiologic factors, which, in the order of their importance, include:

1. A physical change in the position of the mandible, due to a decrease in the vertical dimensional relation with the maxilla, owing to causes explainable from a simple mechanical standpoint;[4] because (a) the teeth may be abraded abnormally; (b) there may be a loss of teeth; (c) the insertion of artificial dentures may decrease the vertical dimension and consequently change the position of the joint head, or (d) malocclusion may be present, with the same result.

Consequently, mastication causes re-

peated trauma in the joint components.

2. Chronic subluxation of the joint is conjectured to have several causes, including anatomic weakness in the joint attachments, shallowness of the glenoid fossa or underdevelopment of the articular eminence. The chronic mechanical trauma is caused by the condylar head traversing forward and backward in excess of the normal anticipated range.

Habitual yawning and/or voluntary abnormal positioning of the teeth due to some pathologic condition may place the joint in an abnormal position.

Acute Trauma: The other obvious cause of internal or intrinsic derangement of the joint is acute trauma to the jaw, in which a single dislocation without fracture may occur. This would disrupt some of the attachments of the meniscus, resulting in a less stable joint. Other acute external forces have been encountered, such as the overenthusiastic use of a mouth-opening gag during general anesthesia.

Bruising blows to the face, which do not necessarily dislocate the joint or permanently damage it, may cause some temporary derangement, owing to edema about or within the joint structure, and may simulate a true temporomandibular joint syndrome. This is due to such factors as hemorrhage into the surrounding tissues or into the masticatory muscles adjacent to the joint. This would create an inflammatory problem simulating synovitis or chondritis.

It is obvious, of course, that fracture-dislocations of the joint create a problem of some magnitude.[5] This will not be discussed here.

Symptoms.—The majority of the patients present themselves to a physician with a definite subjective and objective symptom pattern. Joint noises, "clicking" or "snapping," are frequently an irritation to the patient and, in some instances, to

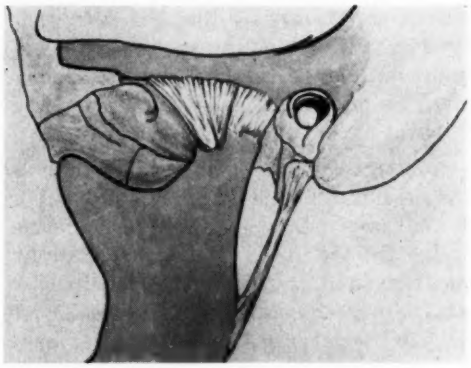

Fig. 1.—Ligamentous capsule covering the temporomandibular joint components.

persons associated with him. Pain at the joint level, aggravated by motion, is usual. Limitation of motion of the temporomandibular joint on the affected side, if unilateral, can be noted both by the patient and by the examiner. This, of course, may be bilateral. Chronic subluxation may occur. Unilateral or bilateral dislocation of the temporomandibular joint is not infrequent.

Additional symptoms include otalgia, tinnitus, and pain over the distribution of the auriculotemporal and trigeminal nerve.

These commonly noticed symptoms may occur singly or in combinations.

Costen,[7] who has written extensively of the temporomandibular joint, has listed the subjective symptoms as follows: pain in the vertex and occiput, otalgia, glossodynia and pain about the nose and eyes. This pain syndrome has not been entirely supported by other investigators, including ourselves. It is now the consensus, supported by our own observations, that the pain caused by internal derangement of the temporomandibular joint is a direct result of inflammatory reaction. The synovitis or chondritis affects the reflex pathways of the auriculotemporal and the trigeminal nerve in the temporomandibular joint capsule.[2b] It is reasonable to assume that, if chondritis or synovitis is present in the joint

area, it is not unlikely that the surrounding supporting tissues, such as the adjacent muscles of mastication, may themselves be affected and be a factor in the aggravation of the primary condition.

Objective Physical Signs.—There is often a limitation of the vertical opening of the jaw. Limited excursion of the condyle in the fossa is demonstrated by palpation, and pain is usually elicited by palpation at the joint site. Deviation of the jaw toward the affected side upon opening is noted in the presence of unilateral derangement. This may be due to trismus of the muscles on that side, meniscal malpositioning preventing the gliding motion of the joint, or any other mechanical obstruction. In addition, there is a voluntary "guarding" by the patient, due to increased pain upon motion. Crepitation, with audible and palpable "snapping" and "crackling" of the joint, is evident. The patient with temporomandibular joint problems and pain frequently assumes a bizarre position of the head and neck when asked to open his mouth, and will thrust the head slightly forward when attempting to open his jaw.

In contradiction of some opinions,[8] roentgen examination of the temporomandibular joint is a valuable adjunct in arriving at a diagnosis for the purpose of planning treatment.[9] Patients with problems referable to the temporomandibular joint should be subjected to roentgen visualization of the joint, condyle and fossa in the closed and open mouth positions. Laminograms are of great value. It is necessary, of course, to examine each side, for reasons of comparison. One single sign, observed in most cases of temporomandibular joint disease, is definite restriction of forward excursion of the condyle on the affected side. In addition to giving an accurate assay of the excursion of the condyle, roentgen study rules out changes caused by systemic diseases, tumor masses or extrinsic lesions. Reduction in the cartilaginous spacing of the joint may be demonstrated in the roentgenogram. Eburnation of the cortex of the glenoid rim may be seen, as may irregularities of the condylar cortex.

The diagnosis is, therefore, logically made upon the basis of objective and subjective symptoms plus the results of regional physical examination. These may be summarized as joint noises, pain and soreness at the joint level, limitation of motion on the affected side, otalgia, and regional pain along the distribution of the auriculotemporal and trigeminal nerves. Intraoral examination may reveal a change of dentition, with abnormal closure of the vertical dimension, or severe malocclusion.

Methods of Treatment.—As one would expect in such a complex problem, innumerable treatments have been suggested, many of which are completely useless and will not be included in this report.

The patient who presents the typical signs and symptoms of internal derangement of the temporomandibular joint usually complains of pain, joint noises or restriction in opening the jaw. Some patients come to the physician's office because of the fear of carcinoma. Such patients are treated by the simple expedient of roentgen examination and reassurance.

In the evaluation of therapeutic methods one must consider the fact that there are normal periods of remission in this condition, regardless of any treatment instituted, and we consider this responsible for some of the enthusiastic reports concerning certain types of treatment.

The patient with a short history of arthralgia and joint noises may be treated by the simple procedure of injection of anesthetic agents, application of heat, voluntary mandibular immobility and administration of the usual analgesics.

In the event that the subjective and objective symptoms of joint derangement

are more characteristic of the chronic type, a roentgen survey is made, which may be followed by injection therapy (injections into the joint fossa).

The use of a long-acting anesthetic is a remedial procedure only and is done to relieve the acute symptoms in the hope that the patient will have a normal remission.

In the event that the two simple procedures noted are not effective, the use of the cortisone drugs is considered. The treatment consists of having the patient place his jaw in the open position as far as possible (Fig. 2), after which a small amount of procaine hydrochloride is placed into the skin anterior to the tragus of the ear and over the hollow created by the forward position of the mandibular condyle. This can be readily palpated. After this, a needle is introduced into the upper synovial cavity, and 0.5 cc. of hydrocortisone is instilled into this space. This procedure is repeated at ten-day intervals, approximately four times. The obvious rationale for this therapy is that it is directed toward elimination of the inflammatory reaction and associated edema, in order to allow the joint to return to its normal physiologic state. Approximately 80 per cent of the patients treated in this manner are relieved of both acute and subacute symptoms.

Hyaluronidase has been used for reasons similar to those indicating hydrocortisone therapy; however, the results of the use of this drug are not conclusive.[2a]

Shultz[10] has long advocated the use of sclerotics placed directly into the joint cavity. Of the sclerotics, "Sylnasol" (sodium psylliate) has been the sclerosing agent of choice. This particular treatment should be restricted to the temporomandibular problem characterized by hypermobility. The technic is simple and is executed in much the same manner as the injection of hydrocortisone. The

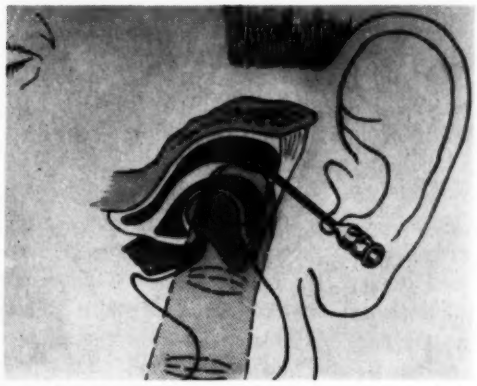

Fig. 2.—Diagrammatic sketch indicating positioning of needle into joint compartment.

sclerosing agent is usually introduced in amounts of 0.25 to 1 cc. This procedure can be repeated. It has been reported to afford relief within six to twenty-four hours. It must be pointed out that this treatment is not without some danger. It is conceivable that enough sclerosing solution could be injected to result in severe limitation of movement. This particular procedure should be approached with reasonable care and judgment.

The foregoing procedures are remedial only and do not attack the basic cause of the symptoms. Their use is primarily directed toward relief of subacute and acute symptoms, and they are to be tried in order to avoid the more complex and sometimes disappointing major intraoral dental or surgical procedures.

Numerous mechanical procedures are used, with varying success. Immobilization of the mandible by interdental intermaxillary wiring is occasionally recommended. This should be continued for six to eight weeks. In almost all cases complete relief is obtained while the joint is at rest. The patient's symptoms, however, frequently return upon active motion of the mandible.

If it has been established that the vertical dimension between the maxilla and

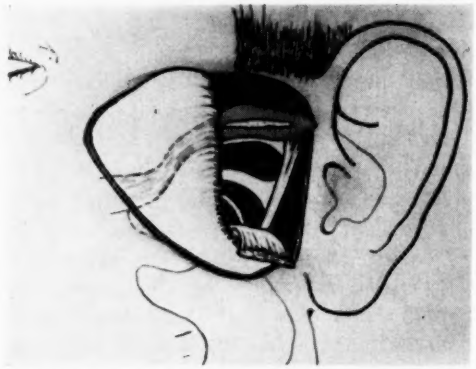

Fig. 3.—Surgical approach, showing reflection of capsular ligament to expose meniscus.

the mandible is decreased, intraoral splints are recommended for the repositioning of the jaw. These splints range from acrylic overlays on the teeth to fitted cast gold or silver splints. They increase the vertical dimension between the jaws and change the position of the joint in the fossa.

In the event that malocclusion with locking bite is encountered, the teeth are subjected to spot grinding of the cusps to allow normal lateral excursion and normal occlusional contact. This will relieve an abnormal position of the mandible in the case of "locked bite." Success can be expected with this method in those cases in which there is definite evidence of incorrect occlusal contact, either laterally or sagittally. The successful use of these temporary dental splints can be followed by reconstruction of the teeth to the desired position by permanent prostheses.

In the event that the foregoing procedures have not been effective and the patient continues to have intractable pain, meniscectomy must be considered[11] (Fig. 3). Meniscectomy consists of removal of the meniscus from the joint fossa. The surgical technic is well known. The approach is through a modified "hockey stick" incision extending from the temporal area and continuing downward just anterior to the tragus of the ear. It is important to have adequate exposure and to avoid the branches of the seventh cranial nerve. It is necessary to sever the lateral ligamentous attachments of the joint in order to visualize the condyle and the meniscus. Occasionally it is difficult to visualize the anterior medial portion of the disk. It is helpful to have an assistant place his finger at the angle of the mandible, intraorally, and to depress the mandible downward to increase the distance between the glenoid rim and the head of the condyle. The disk is excised from its attachments and removed. Extreme care must be taken to avoid trauma to the cartilage over the joint head or that which lines the glenoid fossa, as ankylosis following surgical trauma has been reported. After this procedure the patient will usually have a period of abnormal occlusion. The teeth on the surgically treated side will make contact before those on the opposite side have done so. This usually adjusts itself in five to six weeks. The new position of the joint may affect the opposite side and may subsequently require treatment of that side. The complications of treatment should be brought to the attention of the patient before any surgical procedure is attempted.

Proponents of "surgical high condylectomy," in which the top of the condyle is removed without meniscectomy, have claimed encouraging results in a limited series of cases.[2] The worth of this procedure has not been proved.

SUMMARY

The temporomandibular joint is a complex joint, subject to the abnormal changes which may occur in the other joints of the body in addition to those peculiar to this ginglymoarthrodial joint.

Internal derangement of the temporomandibular joint is most frequently observed in women in the third and fourth

decades of life.

It is conjectured that the principal cause of internal derangement of the temporomandibular joint is dental abnormality that changes the mechanics of mandibular function. Acute external trauma is also a factor, as are habitual yawning and other neurotic tendencies. Systemic diseases as a cause of temporomandibular joint problems are discussed briefly. The syndrome is considered by the authors to be the result of inflammatory changes of the joint components. A program of treatment is outlined which ranges from the most innocuous measures to radical surgical intervention. It is emphasized that symptoms due to derangement of the temporomandibular joint have normal remissions, regardless of the treatment instituted.

A high percentage of these problems can be overcome by the simple expedient of using hydrocortisone in the joint cavity. It is realized that this does not attack the basic cause of the problem; nevertheless, regression of the symptoms frequently follows and may result in a lasting remission.

RIASSUNTO

L'articolazione temporomandibolare è un'articolazione piuttosto complessa che va soggetta ad anomalie come le altre articolazioni del corpo oltre a quelle proprie delle articolazioni ginglimoartrodiali.

La sconnessione interna di essa è frequente nelle donne nel terzo e quarto decennio; essa è dovuta principalmente ad alterazioni dentarie che provocano modificazioni della meccanica masticatoria. Un altro fattore è rappresentato dai traumi, come gli sbadigli abituali e altre manifestazioni nevrotiche. Anche malattie sistemiche possono essere causa di questa lesione.

La sindrome, secondo l'autore, è il risultato di processi infiammatori dei tessuti articolari.

Viene proposto un programma di cura che va dai metodi conservativi più semplici fino all'intervento chirurgico. Viene ricordato che i sintomi dell'affezione vanno incontro a spontanee remissioni, senza alcun rapporto con la cura intrapresa.

La maggior parte dei problemi possono essere risolti semplicemente usando il cortisone nella cavità articolare; questo farmaco, tuttavia, non cura la causa dell'affezione ma produce semplicemente una remissione dei sintomi che può anche essere duratura.

RESUMEN

La articulación temporomaxilar es una articulación compleja sujeta a los mismos trastornos que pueden sufrir las demás articulaciones más los peculiares de ésta.

La luxación interna temporomaxilar se observa más frecuentemente en mujeres entre los 30 y los 50 años.

Se supone que la causa principal de esta luxación sean las anomalías dentales que alteran la mecánica del mecanismo articular. Uno de los factores determinantes es un traumatismo externo agudo así como el bostezo y otras reacciones neuróticas. También se admiten como causas algunas enfermedades sistémicas.

Los autores consideran el síndrome como resultado de alteraciones inflamatorios de los componentes articulares.

Se esboza un programa terapéutico que va desde lo más sencillo hasta la cirugía radical. También se hace notar que los síntomas de los desplazamientos temporomaxilares tienen remisiones espontáneas independientemente del tratamiento instituído.

Muchos de estos trastornos pueden solucionarse por la simple inyección intraarticular de hidrocortisona. Es verdad que esto no ataca las causas fundamentales de la afección pero sin embargo también es

cierto que frecuentemente produce una regresión de los síntomas que puede resultar de gran duración.

ZUSAMMENFASSUNG

Das Kiefergelenk ist ein kompliziertes Gebilde, das sowohl Veränderungen, die in anderen Gelenken vorkommen können, als auch solchen, die für dieses Scharniergelenk spezifisch sind, ausgesetzt ist. Störungen innerhalb des Kiefergelenks werden am häufigsten bei Frauen im dritten oder vierten Lebensjahrzehnt beobachtet.

Man nimmt an, dass die wesentliche Ursache von Kiefergelenksstörungen in Annomalien der Zähne zu finden ist, die die Mechanik der Kieferfunktion verändern. Auch akute äussere Verletzungen, gewohnheitsmässiges Gähnen und andere neurotische Neigungen spielen eine Rolle. Systemerkrankungen als Ursache von Kiefergelenksleiden werden ebenfalls kurz erörtert.

Die Verfasser halten den Symptomenkomplex für einen Folgenzustand entzündlicher Veränderungen der Bestandteile des Gelenkes.

Es wird ein Behandlungsplan entworfen, der sich von äusserst harmlosen Massnahmen bis auf radikale chirurgische Eingriffe erstreckt. Es wird hervorgehoben, dass die auf Störungen im Kiefergelenk beruhenden Symptome normalen Remissionen unterliegen, die von der eingeleiteten Behandlung unabhängig sind.

Ein grosser Teil dieser Störungen kann durch Einspritzung von Hydrocortison in die Gelenkhöhle beseitigt werden. Wenn auch anerkannt wird, dass damit nicht die grundliegende Ursache des Problems angegriffen wird, so wird doch häufig ein Nachlassen der Krankheitserscheinungen und eine dauerhafte Remission erzielt.

RÉSUMÉ

L'articulation temporo-maxillaire est une articulation complexe, sujette à des modifications pathologiques pouvant se rencontrer dans d'autres articulations de ce type.

Les troubles internes de l'articulation temporo-maxillaire se rencontrent le plus souvent chez la femme, dans la troisième et la quatrième décade de la vie.

Il est supposé qu'ils sont principalement dus à des anomalies dentaires modifiant la fonction maxillaire, mais aussi à des traumatismes externes aigus (bâillement, etc.). Les auteurs discutent brièvement les affections organiques pouvant provoquer ces troubles qui s'expliquent par des modifications articulaires inflammatoires.

La thérapeutique est décrite, allant des cas les plus simples jusqu'à la chirurgie radicale, en insistant sur le fait que les symptômes peuvent connaître des rémissions spontanées, quel que soit le traitement institué.

Un grand nombre de complications peuvent être jugulées grâce à l'injection d'hydrocortisone dans la cavité articulaire. Celle-ci ne s'attaque pas à la cause initiale de l'affection, mais il n'en reste pas moins qu'elle est fréquemment suivie de la régression des symptômes et peut amener une rémission durable.

BIBLIOGRAPHY

Berry, D. C.: The Movement of the Meniscus of the Temporomandibular Joint: Preliminary Report, Lancet 1:82-83 (Jan. 12) 1952.

Berry, H. M., and Hoffman, F. A.: Cinefluorography with Image Intensification for Observing Temporomandibular Joint Movements, J.A.D.A. 53:517-527 (Nov.) 1956.

Beyers, M. R., and Teich, S.: Mandibular Joint Neuralgia, Arch. Int. Med. 90:389-391 (Sept.) 1952.

Christie, H. K.: Internal Derangements of the Temporomandibular Joint, J. Internat. Coll. Surgeons 19:704-715 (June) 1953.

Costen, J. B.: The Present Status of the Mandibular Joint Syndrome in Otolaryngology. Tr. Am. Acad. Ophth. & Otol. 55:809-823 (Nov.-Dec.) 1951.

DeLorimier, A. A.: Arthroplasties of the Temporomandibular Joint: Roentgenologic Aspects, Am. J. Surg. 85:616-625 (May) 1953.

Dingman, R. O., and Moorman, W. C.: Meniscectomy in the Treatment of Lesions of the Temporomandibular Joint, J. Oral Surg. 9:214-224 (July) 1951.

Henny, F.: Painful Temporomandibular Joint, J. Oral Surg. 12:341-342 (Oct.) 1955.

Kiehn, C. L.: Meniscectomy for Internal Derangement of Temporomandibular Joint, Am. J. Surg. 83:364-373 (March) 1952.

Kochan, E. J.: Treatment of Temporomandibular Joint Disturbances with Hyaluronidase, Oral Surg., Med. & Path. 9:513-515 (May) 1956.

Lewis, G. K.: Surgical Diseases of the Temporomandibular Joint, Illinois M. J. 106:353-358 (Dec.) 1954.

Lindblom, G.: Disorders of the Temporomandibular Joint, J.A.D.A. 49:30-38 (July) 1954.

Plewes, B., and Mighton, A. K.: Impacted Posterior Fracture-Dislocation of the Temporomandibular Joint, Brit. J. Surg. 39:522-524 (May) 1952.

Ricketts, R. M.: Laminography in the Diagnosis of Temporomandibular Joint Disorders, J.A.D.A. 46:620-648 (June) 1953.

Rongetti, J. R.: Meniscectomy: A New Approach to the Temporomandibular Joint, Arch. Otol. 60:566-572 (Nov.) 1954.

Schreiber, H. R.: An Anatomic and Physiological Approach to Treatment of Temporomandibular Joint Disturbances, J.A.D.A. 48:261-265 (March) 1954.

Schultz, L. W.: Twenty Years' Experience in Testing Hypermobility of Temporomandibular Joints, Am. J. Surg. 92:925-928 (Dec.) 1956.

Silver, C. M.; Simon, S. D., and Savastano, A. A.: Meniscus Injuries of the Temporomandibular Joint, J. Bone & Joint Surg. 38A:541-552 (June) 1956.

Stephenson, K. L., and Graham, W. C.: The Use of the Kirschner Pin in Treatment of the Condyle, Plast. & Reconstr. Surg. 10:19-23 (July) 1952.

Thoma, K. H.: Oral Pathology. St. Louis: The C. V. Mosby Company, 1954, 4th ed. Pp. 848-886.

The Good Great Surgeon

"Tell me, Sir," a trainee asked Sir Clement Price Thomas, "what do you consider to be the qualities of a good surgeon?" First, Sir Clement defined, a surgeon must have the requisite knowledge and skill. Second, he must have the ability to put himself in the place of the patient, to enter into his feelings and to be able to give him a quiet mind. For any patient to get a quiet mind he must have confidence in the doctor. He must be satisfied that the treatment outlined was correct. And then there was the residual something which the patient had to settle for himself. The quiet mind was achieved most easily and most satisfactorily by people who had faith in God.

Shakespeare, whose plays clearly delineate the peculiarities as well as the foibles of physicians, surgeons, apothecaries, tooth drawers, midwives and nurses, mentioned the name of Hippocrates but once. There is no evidence that Shakespeare had any profound knowledge of Hippocratic thought, for Shakespeare was, after all, rather a genius than a scholar. His Dr. Caius, of the "Merry Wives of Windsor," for instance, bears no resemblance to the learned Dr. Caius of London, and to Shakespeare it was probably merely a name. Yet Shakespeare had much knowledge of medicine, and Sir John Bucknill has shown that practically all Shakespeare's references to medicine, strange and uncouth as some of them sound to modern ears, were in complete accord with prevailing medical views. Shakespeare, as Bucknill remarked, "had, at least, been a diligent student of all medical knowledge existing in his time." Griffiths observed, "If Hippocrates had been an Elizabethan dramatist, the style of his writing would have been Shakespearan; and had Shakespeare been a Greek physician, his characteristics would have been those of Hippocrates, as a close observer and recorder of signs and a frugal prescriber of drugs."

—Major

Surgical Treatment of Defects of the Scalp

REED O. DINGMAN, M.D., F.A.C.S.

ANN ARBOR, MICHIGAN

THE scalp, because of its exposed and vulnerable position, is subject to many types of trauma, as well as to infection and all the neoplastic and congenital lesions of any cutaneous surface. Until recent years many patients with lesions of the scalp did not survive, because the principles and technics of obtaining a closed scalp wound were unknown. Harvey Cushing,[1] in World War I, was one of the first to emphasize the need for adequate closure of traumatic scalp defects. Since then, certain principles governing the treatment of lesions of the scalp have become widely accepted.

Etiologic Considerations.—The increase in traumatic lesions of the scalp has paralleled the mechanical and technicologic advances of recent times. Total avulsion of the scalp by entanglement of a woman's hair in rotary machinery accounts for many scalp injuries.[2] Numerous defects are observed as a result of automobile accidents.[3] Missiles employed in war account for scalp injuries,[1] many of which are combined with intracranial damage of concern to the neurosurgeon. Scalp defects are caused by burns, which may be electrical,[4] thermal,[5] chemical,[2a] or the result of irradiation.[2a] Clawing or biting by animals, such as dogs, horses and bears, has resulted in severe scalp avulsion and injuries.[6]

Destructive lesions of the scalp may be due to uncontrolled sepsis,[2a] such as hidradenitis suppurativa, or to the extension of infection from osteomyelitis of the skull.[7] Benign and malignant tumors of the scalp account for a large number of surgical cases. The benign pigmented nevus that is poorly covered by hair or extends into nonhairbearing scalp often requires surgical treatment for cosmetic reasons.[8] Dermoid and sebaceous cysts, osteomas, circoid aneurysms, eosinophilic granulomas, hemangiomas, lymphangiomas and verrucous and junctional nevi frequently present problems requiring surgical treatment. Malignant lesions of the scalp consist mainly of primary basal cell carcinoma, squamous cell carcinoma, melanoma, sweat gland adenocarcinoma and fibrosarcoma.[9] Although metastases to the scalp are rare, metastatic carcinoma from the breast to the scalp has been reported.[9b]

Congenital absence of a portion of the scalp is a rare occurrence. Kahn[10] and others have stated that if these defects lie over the visible blood vessels or suture lines the membranous portion of the defect should be excised and primary closure of the scalp effected if possible; if not, split-thickness skin grafts should be used as a temporary expedient. This should be done as soon after birth as possible, in order to prevent the sequelae of necrosis followed by erosion of vessels and death. Grossman and his associates[11] reported a case involving twins joined together in the cranial area (craniopagus), in which surgical separation was followed by correction of the scalp defects by local flaps and skin grafts.

Anatomic Considerations. — There are five layers of scalp (Fig. 1). The skin of the scalp is thicker than that anywhere

From the Department of Surgery, University Hospital and The University of Michigan School of Medicine, Ann Arbor.

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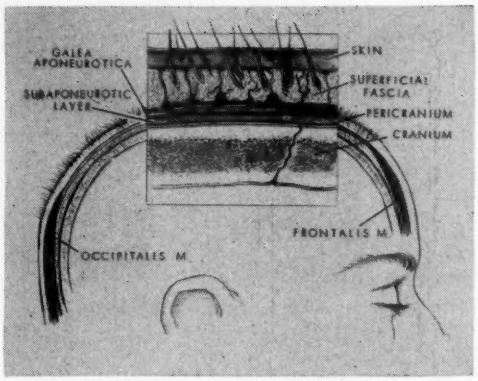

Fig. 1.—The five layers of scalp. Note that galea aponeurotica has muscular attachments anteriorly and posteriorly, thus accounting for wide gaping of transverse wounds through this layer.

else in the body. It is especially thick in the occipital region and less thick in the frontal and temporal and mastoid areas. The skin is firmly bound to the galea aponeurotica by an intervening layer of subcutaneous tissue and superficial fascia that contains the major blood vessels of the scalp. The galea aponeurotica is a dense tendinous structure intimately connected with the frontalis muscle anteriorly and the occipitalis posteriorly. The action of these antagonistic muscles draws the galea tightly over the cranium, which accounts for the gaping of wounds in which the galea is cut transversely. After the excision of a scalp lesion, the resultant defect may appear much larger than the actual area of excision. This is due to the pull of the occipitofrontalis muscle on the galea, which slides freely over the subaponeurotic layer of loose areolar tissue lying between the galea and the pericranium. An appreciation of this phenomenon is important in outlining and planning a pedicle flap from an adjacent area.

Immediately below the subaponeurotic layer is the pericranium or periostium of the skull. The pericranium is a fibrous membrane containing blood vessels and intimately attached to the outer table of the skull.

The scalp is supplied by five paired arteries: anteriorly these are the frontal

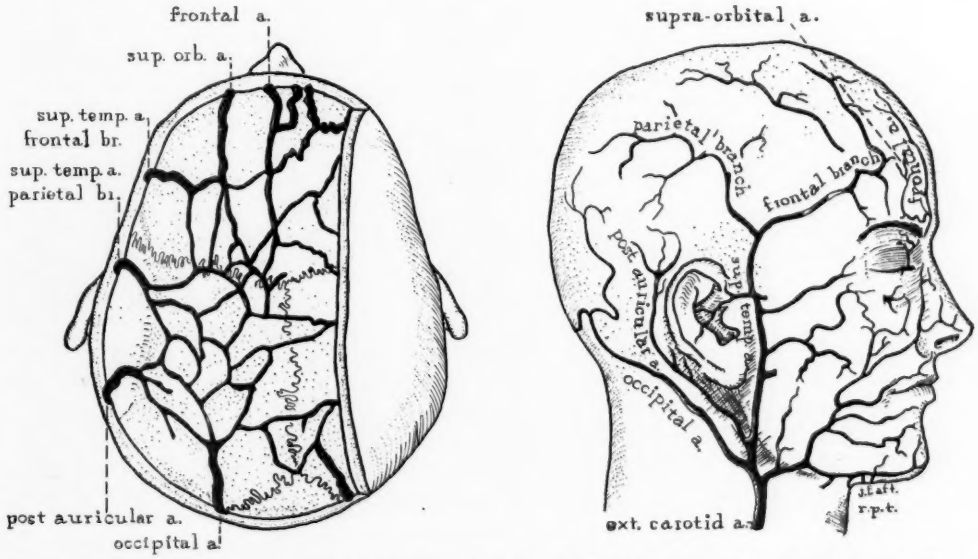

Fig. 2.—Blood supply to scalp. Consideration of these arteries is important in planning scalp flaps. Anastomosis of smaller vessels is present across midline.

Fig. 3.—Extensive scalp lacerations were caused by motor accident. All foreign materials were removed, minimal debridement done, and the flaps of scalp sutured carefully in place.

and supraorbital branches of the ophthalmic; laterally, the superficial temporal and posterior auricular branches of the external carotid artery, and posteriorly, the occipital branch of the carotid artery (Fig. 2). Although there is an anastomosis of vessels across the midline, this in most instances is not generous, and for this reason flaps generally should not be designed to extend across the midline unless they are delayed or are of the bipedicle type. All scalp vessels are peripheral and are not branches of perforating vessels, as in other areas of the body. As far as possible, it is desirable to base all flaps on the scalp toward the periphery and design them so that they are in the pathway of one of the major vessels. It is unnecessary to undercut flaps in the scalp in "delaying" procedures, since there are no

Fig. 4.—Woman aged 53, who had had multiple cylindromas over her body since the age of 18. Basal cell carcinoma developed in posterior auricular region and was treated elsewhere by excision and cautery—note scar and exposed mastoid bone. Area treated by excision of scar and rotated pedicle flap to cover defect. Split thickness skin graft was employed to cover donor site of flap.

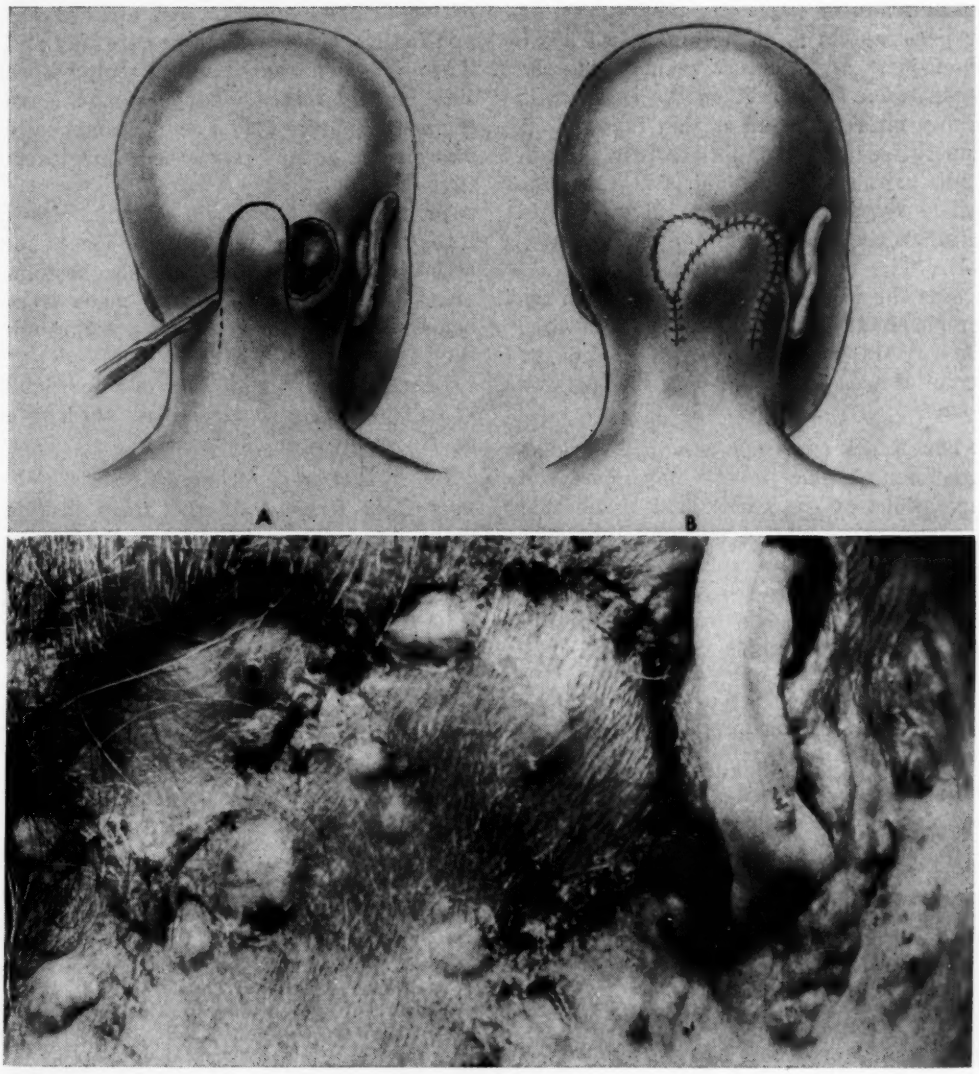

Fig. 4 (*continued*).

important perforating vessels. Simple outlining incisions are adequate for interruption of the blood supply.[12] It is inadvisable to plan flaps that are traversed by existing scars extending through the galea. Generally the blood supply will not be sufficient to support the tissues distal to the scar, and necrosis will result.

Scalp flaps should consist of the skin, the superficial fascia and the galea aponeurotica, and should be elevated on the subaponeurotic layer without interference with the pericranium. The pericranium contains an excellent blood supply and will adequately support split thickness skin grafts used to cover defects produced by

mobilization of flaps. If the periosteum or pericranium is entirely stripped away by injury or surgical maneuvers, the "take" of a free graft on the cranium is highly improbable. For this reason it is imperative that the pericranium remain undisturbed in the raising of a scalp flap.

The lymphatic drainage of the scalp parallels the route of the major blood vessels. The anterior portion of the scalp drains through the nodes of the face; the temporal and parietal areas drain through the carotid and mastoid nodes, and the occipital areas drain through the occipital nodes.

The Acute Injury. — Radical débridement has no place in the management of lacerations of the scalp. All tissue that has any possibility of survival should be saved. The blood supply is generous in the scalp, and large segments of partially avulsed scalp attached by a small pedicle flap have a good chance of survival. Only obviously devitalized portions of scalp should be discarded. My experience has shown that the rich vascular supply of the scalp will often support large flaps with narrow pedicles, even when these pedicles have been based away from any major arterial supply. All dirt, grease and foreign bodies should be carefully and thoroughly removed from the scalp before suturing, as these substances may leave pigmented areas that are cosmetically undesirable or may cause secondary infection (Fig. 3).

Small scalp defects can often be closed by extensive undermining in the loose subaponeurotic layer. This may also be combined with relaxing incisions made from below, through the galea but not through the subcutaneous fascia.[2a]

Larger defects with loss of superficial scalp layers may require repair with free grafts or with pedicle flaps.

Correction of Defects with Split Thickness Skin Grafts.—If the scalp loss is extensive, split thickness skin grafts can be successfully applied to the defect to obtain a closed wound. Sheets of split thickness skin cut with the dermatome from the thighs or the abdomen and placed on the intact pericranial layer have given excellent results. Their good "take" is largely due to the adequate blood supply of the pericranial layer. When the scalp has been avulsed, the separation usually occurs in the subaponeurotic layer, so that

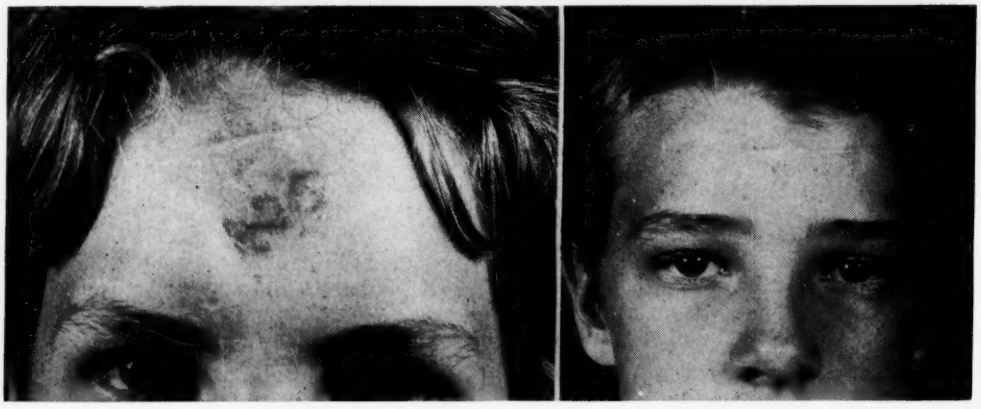

Fig. 5.—Localized osteomyelitis had been treated by removal of skin and a portion of frontal bone one year previously, defect being covered by split thickness skin graft. The pulsating skin graft was excised and a bipedicle flap advanced to cover defect. Bone graft will be inserted.

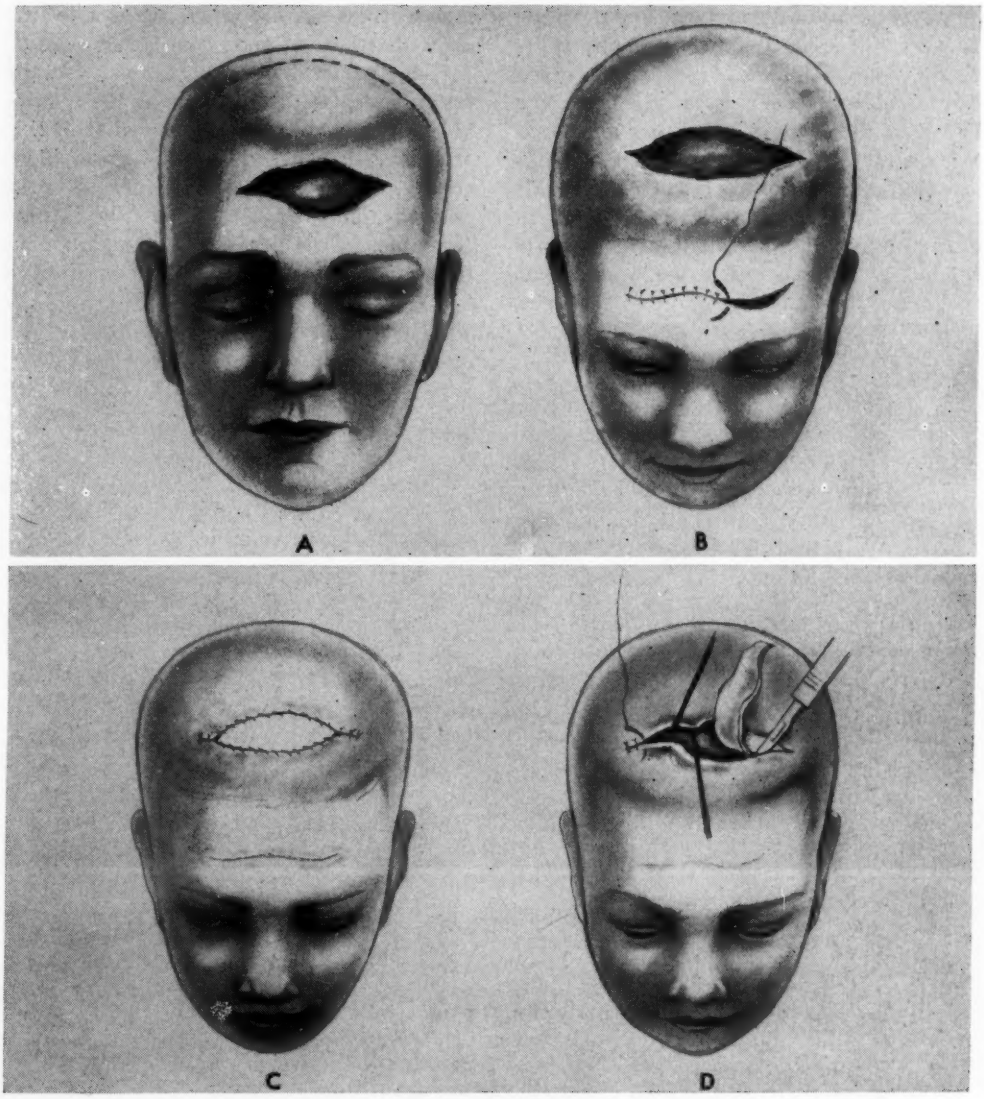

Fig. 5 (*continued*).

the pericranium is intact and capable of receiving a split thickness skin graft. It is useless to replace or retain a full thickness section of avulsed scalp completely separated from its blood supply, as the thickness of the tissues will not permit adequate nourishment of the scalp as a free graft.[13] Delak,[14] in April 1955, reported the first instance of a human patient in whose case there was partial success in replacement of an avulsed scalp after it had been thinned out from its undersurface with a Thiersch Knife. Three months after the "take" the graft showed

very fine hairs on its surface. The possibility of using split thickness or split split-thickness skin grafts from the avulsed scalp and then reapplying them to the defect in the hope of obtaining an actual hair-bearing skin graft has been the subject of experimental work, both in animals and in man.[15] Osbourne[15b] has shown in young pigs that split split-thickness grafts employing skin between 0.025 and 0.05 inches thick gives viable skin and the growth of hair of good quality.

If the pericranium is torn away and the cranium exposed, it is imperative to provide an immediate covering for the bone. If denuded bone, deprived of its blood supply, is not immediately covered, bone necrosis and sequestration are highly probable. Free grafts of split skin have no chance of "taking" on the outer table

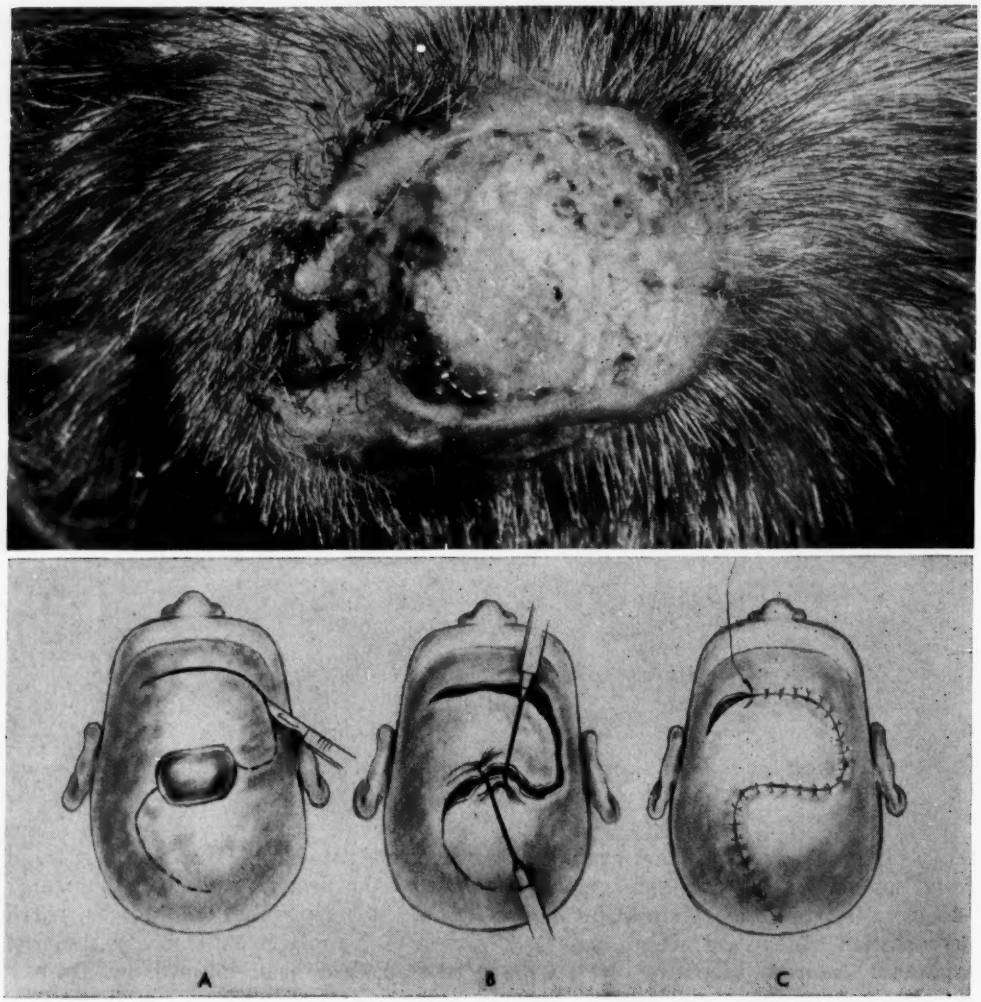

Fig. 6.—Following the wide excision of a trichomatrioma of the scalp, double transposition flaps were rotated to allow the primary closure of the scalp defect.

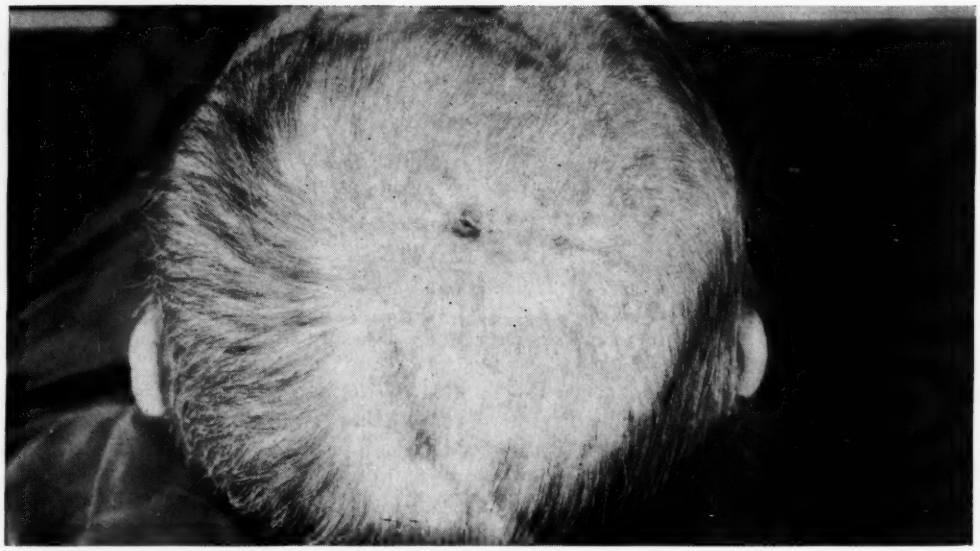

Fig. 6 (*continued*).

of bone. If possible, a flap should be outlined and rotated over the exposed bone area for coverage. If no tissue is available for development of a flap, the outer table of bone should be removed with periosteotomes. Thin split thickness skin grafts "take" well on a bed of this type when applied as a dressing graft immediately after removal of the outer table. If the graft does not survive, a velvety area of granulation will develop within a week or ten days, which will offer a good bed for another split skin graft.

Correction of Defects with Scalp Flaps.—Scalp flaps can often be rotated or transposed when it is desirable to place hair-bearing tissue in strategic positions. In the preparation of scalp flaps the skin,

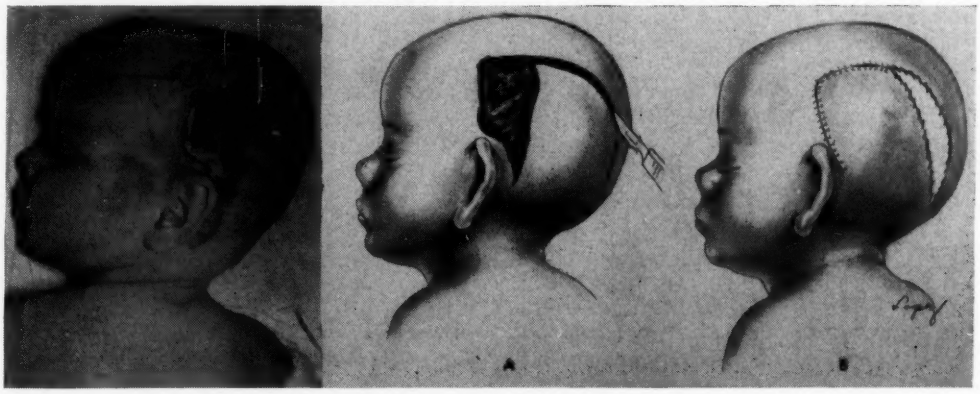

Fig. 7.—Partially avulsed scalp which, after a motor accident, was immediately sutured in place. Patient was admitted with slough of flap. Repair was accomplished by sliding rotation flap to cover defect and split thickness skin graft to donor site (see drawings).

Fig. 8.—Preoperative (*A* and *B*) and postoperative (*C*) views of deformity due to skin graft placed to cover defect incident to excision of nevus.

subcutaneous tissue and galea aponeurotica are raised as one layer. The flap is based at the periphery of the scalp and positioned so that it contains adequate vessels for arterial flow and venous return. In general, the two-to-one ratio of length to width provides a safe transposition type of pedicle flap in the scalp; in areas where larger arteries and veins are included in the flap, however, greater liberties may be taken (Fig. 4). It is generally inadvisable to plan a retrograde flap in the scalp—that is, a flap based against its blood supply. This sometimes is necessary, however, and when it is the flap should be carefully outlined with a wide base and constructed by the "delay" technic. Since there are no perforating vessels between the superficial and deep layers of the scalp, it is unnecessary to undermine during the delay procedure. Completely cutting through the galea aponeurotica

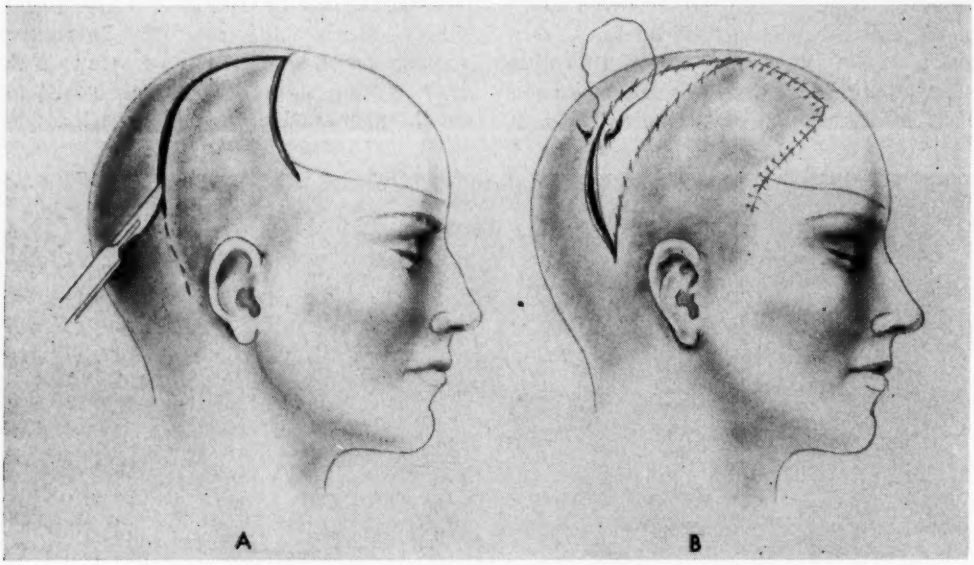

Fig. 9.—Successive steps in operation performed on patient shown in Figure 8. Sliding rotation scalp flap was advanced to frontal area to reestablish hair line. Split thickness skin graft in donor site was later removed by multiple excision procedures.

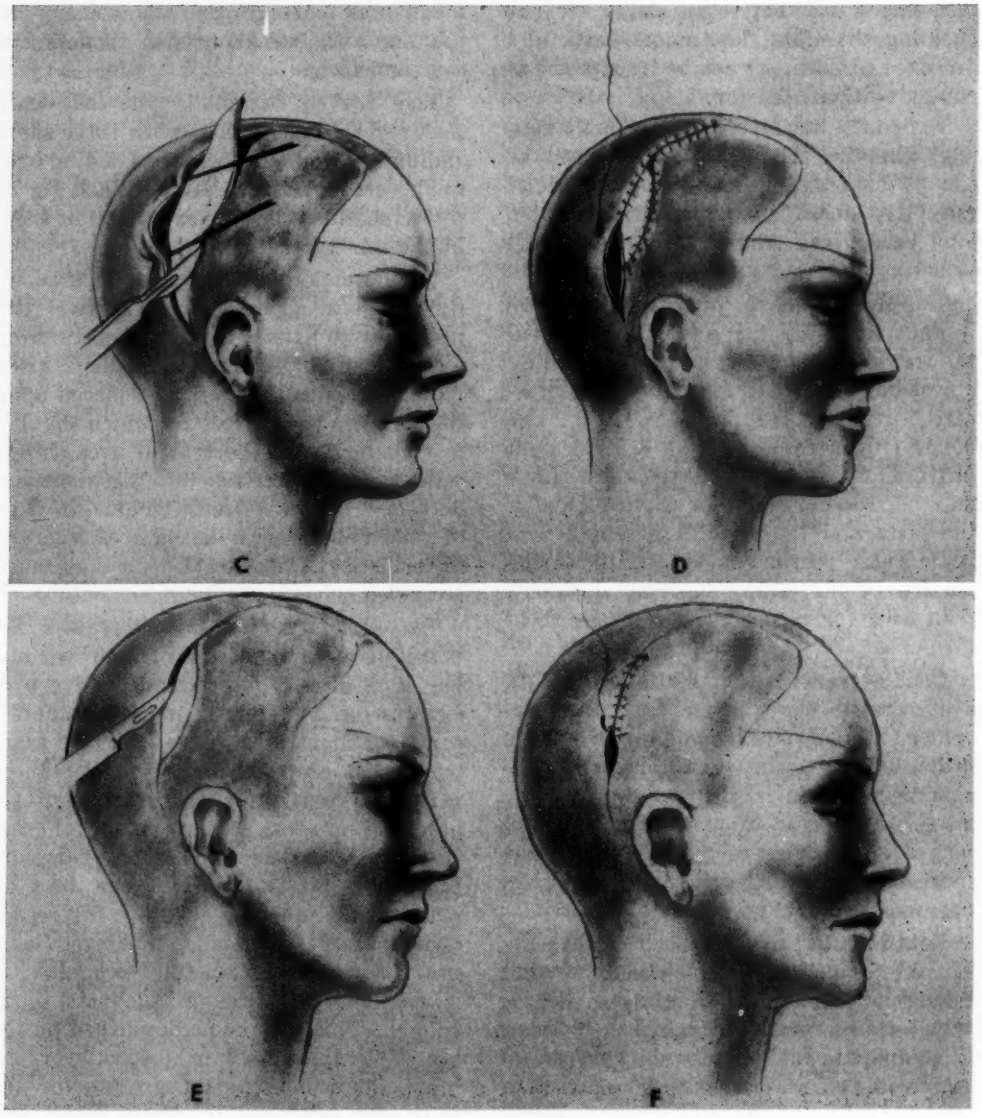

Fig. 9 (*continued*).

will interrupt the blood supply so that the flap can develop a collateral supply adequate to maintain its vitality when advanced. When the use of a retrograde flap is necessary as an emergency procedure, it should be made by a long incision outlining a wide flap, in order to assure its viability.

In repairing defects of the scalp it is desirable to use local tissue flaps, as hair-bearing tissue improves the cosmetic result. As the scalp is thick, dense and

inelastic, it does not rotate easily without buckling, therefore, flaps must be carefully designed so that they can be transposed or rotated without tension.

Flaps may have a single or double pedicle; that is, they may be attached at one or both ends. The donor site, if it cannot be closed by direct approximation, may be covered with a thick split graft or a secondary local flap (Fig. 5).

Converse[12] has pointed out that, in wounds involving the forehead and frontal area in which bone is exposed or lost, a bipedicle visor flap may be used temporarily to cover the frontal defect. The donor site is repaired with a thick split graft. At a later date, full thickness tissue may be transferred from another part of the body and the visor flap returned to its normal position in the hair-bearing portion of the scalp. The distant flap is then used for reconstruction of the frontal defect.

Double transposition flaps, or Z flaps, are useful in many instances and are developed as two contiguous flaps with their pedicles in opposite directions, the incision being made in the shape of a Z or an S. This type of procedure is useful in providing a flap of hair-bearing tissue in areas where the hair-bearing scalp has been destroyed (Fig. 6).

Rotation flaps as described by Sir Harold Gillies[16] may be useful in closing triangular defects. In outlining the so-called sliding rotation flap, one should plan this flap on the side bordered by the greatest amount of scalp tissue. The direction of the blood supply must also be considered in the development of this flap. The flap is outlined roughly in a semicircular line, with the diameter of the flap at least twice as great as the width of the defect to be closed (Fig. 7). It is important to make the flap large enough to insure that there is absolutely no tension at its tip. Another detail that will further release tension on the flap is to make a small extension of the flap incision along the diameter of the semicircle.

The curved "tripod" type of scalp closure[16] is actually done with three short sliding rotation flaps, each one sliding only to the center of the defect. Each leg of the tripod must be curved and all of them in the same direction.

Whenever local flaps cannot be used, as in the repair of large cranial defects, it is necessary to have a flap transferred from a distant area. A tube pedicle flap, raised from the abdominal area and placed upon the wrist as the carrier by which the flap is transferred to the cranial area, is excellent for correction of these cranial defects.[12] This is a useful technic, as flaps of almost any size can be elevated from the abdomen and transferred upon the arm as a carrier.

Late Reconstructive Procedures.—If the principle of early closure of scalp wounds has been closely observed, definitive procedures can be deferred, if it seems necessary, for months or years after the scalp wound has been closed. Such procedures may be necessary for improvement of appearance or for reconstruction of soft tissue or bone defects to restore function. Split skin grafts placed on the dura do not provide adequate covering for reconstruction of the skull. Wherever bone grafts are to be placed, full thickness skin is necessary to provide adequate blood supply. This may be accomplished by the use of local scalp flaps placed over the brain immediately after excision of the split skin graft. The donor defect can be covered with a split skin graft placed on the pericranium. After the flap has become adequately established, it may safely be elevated and bone grafts placed for skull reconstruction.[17]

If local scalp tissue is not available for covering brain areas, pedicle flaps from a distance, carried on the arm, can be

brought up and placed over the defect immediately after excision of the split thickness graft. This type of flap provides an adequate blood supply for bone grafting procedures. Primary bone grafts should not be used at the time the flap is transferred from a distant area. The tissues should be permitted to become established and develop a good blood supply before any attempt is made to reconstruct the cranial vault. The use of split rib bone grafts has been advocated by Longacre,[18] who has successfully used these in extensive skull reconstruction. I have observed that the ilium provides adequate bone for reconstruction of large skull defects.[17]

Transposition of hair-bearing flaps for establishment of the hairline,[19] and multiple excision procedures for removal of skin grafts or scars, make up the majority of definitive procedures used for cosmetic purposes (Fig. 8).

CONCLUSIONS

Scalp lesions requiring surgical treatment are becoming more numerous as the result of an increase in traumatic injuries and neoplasms. Radical débridement has no place in the management of scalp injuries. Whenever possible, the principle of early wound closure should be observed. This can be accomplished by the use of split thickness skin grafts or local pedicle or rotation flaps. Totally avulsed sections of scalp will not survive as free grafts, and in these cases it is best to use free thick split skin grafts for repair. Local pedicle or rotation flaps, or flaps transferred from a distance, must be used in preparation for bone grafts, since split thickness skin grafts will not provide adequate covering for the nourishment of bone grafts.

SCHLUSSFOLGERUNG

Chirurgische Behandlung erfordernde Erkrankungen der Kopfhaut kommen mit dem Zunehmen von Unfallsverletzungen und mit der wachsenden Zahl von Geschwülsten häufiger zur Beobachtung. Die radikale Wundtoilette findet bei der Behandlung von Kopfhautverletzungen keine Anwendung. Der Grundsatz frühzeitiger Wundschliessung sollte wenn immer möglich befolgt werden. Dieses lässt sich durch die Verwendung freier Epidermislappen oder von Stieltransplantaten oder von gedrehten Stiellappen erreichen. Völlig ausgerissene Kopfhautstücke lassen sich als freie Transplantate nicht erhalten, und in diesen Fällen verwendet man am besten freie dicke Epidermislappen zur Reparatur. Gestielte Lappen, gedrehte Stiellappen oder aus einer gewissen Entfernung transplantierte Lappen müssen als Vorbereitung für Knochentransplantate verwendet werden, weil freie Epidermislappen keine für die Ernährung des Knochentransplantats ausreichende Bedeckung sind.

CONCLUSIONS

Les lésions du cuir chevelu nécessitant un traitement chirurgical deviennent plus fréquentes avec l'augmentation des accidents de la circulation et des néoplasmes. Le débridement radical n'a pas sa place dans ces cas. Il faut s'en tenir aussi souvent que possible à la règle de la fermeture précoce de la plaie au moyen de greffes cutanées dédoublées, de pédicules locaux ou de lambeaux rotatifs. Les parties du cuir chevelu entièrement arrachées ne peuvent reprendre en tant que greffes libres; il est indiqué dans ces cas de recourir à des greffes cutanées dédoublées. Les pédicules locaux ou les lambeaux rotatifs ou encore les lambeaux prélevés à distance doivent être utilisés pour les greffes osseuses, car les greffes cutanées dédoublées ne procurent pas une couverture suffisante pour l'irrigation des greffes osseuses.

CONCLUSIONI

Le lesioni del cuoio capelluto di interesse chirurgico sono divenute sempre più frequenti in rapporto all'aumento dei traumi e dei tumori. Lo sbrigliamento radicale non trova più indicazione nel loro trattamento. Ogni volta possibile si dovrà tentare la sutura immediata; si useranno trapianti cutanei a tutto spessore o trapianti a lembo peduncolato. Parti di cuoio capelluto già completamente staccate non sopravvivono al reinnesto; in questi casi la cosa migliore è di usare trapianti liberi di cute. I trapianti peduncolati, invece, ricavati localmente, o per rotazione, o per trasporto da lontano, avranno più opportuno impiego quando sia necessario anche un trapianto osseo, poichè sono in grado di fornire un sufficiente nutrimento all'osso stesso.

CONCLUSIONES

Las lesiones de scalp que requieren tratamiento quirúrgico se van haciendo más numerosas como resultdado de las heridas traumáticas y de las neoplasias. El desbridamiento radical no tiene plaza en el tratamiento de las heridas con scalp. Siempre que fuere posible debe observarse el principio del cierre precoz de la herida. Esto debe hacerse por medio de injertos cutáneos o de colgajos rotatorios. Los trozos de scalp completamente desprendidos no sobreviven como injertos libres y en este caso lo mejor es aplicar injeros de piel completa para la reparación. Los colgajos rotatorios o pediculados, o los colgajos transportados a distancia son los más aptos para cuando se han de usar injertos óseos ya que los injertos cutáneos libres no proporcionan la cubierta suficiente para la nutrición de el injerto de hueso.

REFERENCES

1. Cushing, H. A.: A Study of a Series of Wounds Involving the Brain and its Enveloping Structures, Brit. J. Surg. 5:558-684, 1918.

2. (a) Kazanjian, V. H., and Webster, B. C.: Treatment of Extensive Losses of the Scalp, Plast. & Reconstr. Surg. 1:360-385, 1946. (b) Wynn, S. K.: Free Pattern Skin Graft in Total Scalp Avulsion, Plast. & Reconstr. Surg. 7:225-236, 1951. (c) Davis, J. S.: Scalping Accidents, Johns Hopkins Hosp. Rep. 16:258-362, 1911. (d) Robinson, F.: Complete Avulsion of the Scalp, Brit J. Plast. Surg. 5:37-50, 1952. (e) Straith, C. L., and McEvitt, W. G.: Total Avulsion of the Scalp, Occup. Med. 1:451-462, 1946.

3. Beers, M. D., and Pirruccello, F. W.: Management of Serious Scalp Injuries, Postgrad. Med. 14:487-493, 1953. Kazanjian and Webster.[2a]

4. Bagozzi, I. C.: Loss of Scalp and Bone Caused by Serious Electrical Lesions, Brit. J. Plast. Surg. 8:49 54, 1955. Kazanjian and Webster.[2a]

5. Kazanjian and Webster.[2a] Davis.[2c]

6. Howard, L. L.; Armstrong, T. M., and Smith, D.: Avulsions of the Scalp with Plastic Repair, Am. J. Surg. 80:714-717, 1950. Davis.[2c]

7. Vallis, C. P., and Humphreys, S. P.: Treatment of Extensive Defects of Scalp and Skull, J. Internat. Coll. Surgeons 26:249-252, 1956.

8. Cronin, T. D.: Extensive Pigmented Nevi in Hair-bearing Areas, Plast. & Reconstr. Surg. 11:94-106, 1953.

9. (a) Braund, R. R., and Pigott, J. D.: Surgical Treatment of Massive Scalp Lesions, Cancer 9:1227-1233, 1956. (b) James, A. G.; Anderson, R. G.; School, J. A., and Martin, B.: Cancer of the Scalp, Am. J. Surg. 80:441-445, 1950. (c) Fitzgibbon, G. M., and Bodenham, D. C.: Malignant Disease of the Face and Scalp, Brit. J. Plast. Surg. 2:13-20, 1949.

10. Kahn, E. A., and Olmedo, L.: Congenital Defect of the Scalp, Plast. & Reconstr. Surg. 6:435-440, 1955.

11. Grossman, H. J.; Sugar, O.; Greeley, P. W., and Sadove, M. S.: Surgical Separation in Craniopagus, J.A.M.A. 153:201-207, 1953.

12. Kahn, E. A.; Bassett, R. C.; Schneider, R. C., and Crosby, E. C.: Correlative Neurosurgery. Springfield, Ill.: Charles C Thomas, Publisher, 1955.

13. Straith, C. L., and Beers, M. D.: Scalp Avulsions, Plast. & Reconstr. Surg. 6:319-326, 1955. Kazanjian and Webster.[2a] Robinson.[d2]

14. Delak, Z.: Successful Replacement of the Completely Avulsed Scalp, Brit. J. Plast. Surg. 8:55, 1955.

15. (a) Meister, E.: Scalp Avulsions, Brit. J. Plast. Surg. 8:44-48, 1955. (b) Osbourne, M. P.: Complete Scalp Avulsion, Ann. Surg. 132:198 213, 1950. (c) Kazanjian and Webster.[2a] (d) Straith and McEvitl.[2e]

16. Gillies, H.: Note on Scalp Closure, Lancet 2:310-311, 1944.

17. Dingman, R. O.: Iliac Bone Cranioplasty, Plast. & Reconstr. Surg. 9:130-139, 1952.

18. Longacre, J. J., and DeStefano, G. A.:

Reconstruction of Extensive Defects of the Skull with Split Rib Grafts, Plast. & Reconstr. Surg. 19:186-200, 1957.

19. Lewis, S. R.; Blocker, J. G., and Eade, G. G.: Problems of Scalp Reconstruction, Plast. & Reconstr. Surg. 20, 1957.

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Executive Director,
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Management of Carcinoma of the Lip

F. X. PALETTA, M.D., F.A.C.S., D.A.B.

ST. LOUIS, MISSOURI

THERE is some controversy as to whether carcinoma of the lip should be treated by surgical intervention or by irradiation. Surgical treatment is preferable, for the following reason: Surgical removal of the entire vermilion border (lip shave) for leukoplakia of the lower lip has been emphasized in a recent report[1] in which 12 per cent of the lesions clinically diagnosed as leukoplakia were actually carcinoma *in situ*. Similarly, it is advisable to extend the V excision for carcinoma of the lip to include a lip shave of the remaining vermilion border. This will prevent the development of a second neoplastic lesion, since frequently the remaining vermilion shows some evidence of leukoplakia and may contain another focus of neoplasia. Since leukoplakia is usually not treated by irradiation, other foci of neoplasia will be missed when carcinoma of the lip is irradiated.

From the Department of Surgery, St. Louis University School of Medicine and Veterans Hospital, St. Louis.

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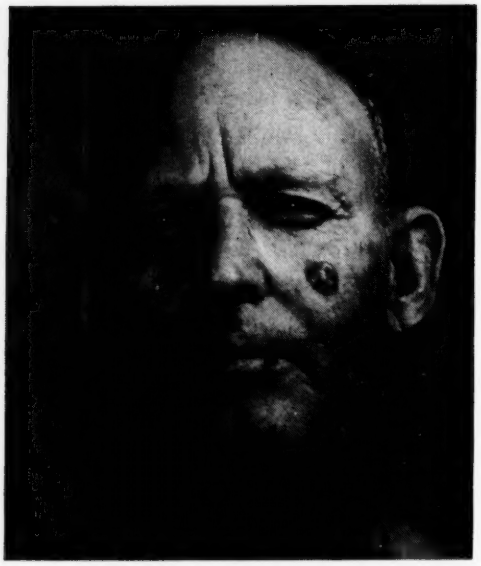

Fig. 1.—Patient aged 50 with multiple carcinoma *in situ* of lower lip. Basal cell epithelioma of left cheek is also present.

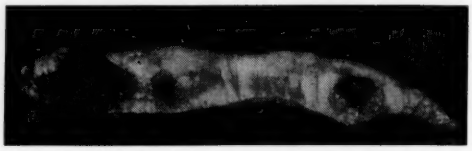

Fig. 2.—Specimen from lip shave of patient shown in Figure 1.

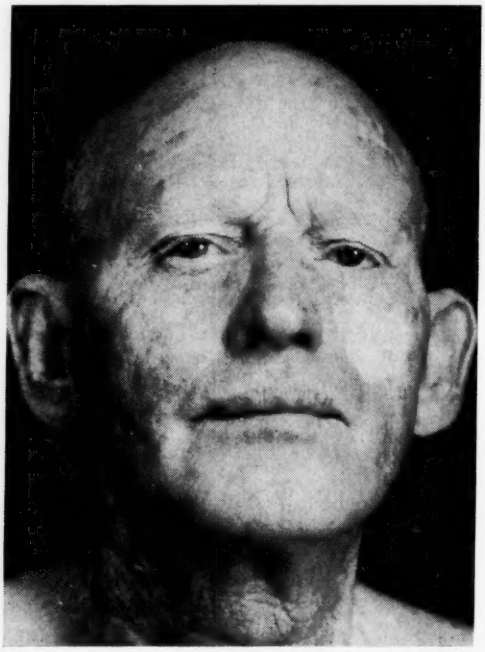

Fig. 3.—Three years after operation on lip and cheek.

REPORT OF CASES

CASE 1.—A man aged 50 had multiple ulcerations of the lower lip (Fig. 1), covered with thick crusts. Biopsy revealed the lesion to be carcinoma *in situ*. A lip shave (Fig. 2) was done with the region under local anesthesia. There has been no evidence of recurrence (Fig. 3). A basal cell epithelioma of the left cheek was excised and skin grafted. Several other lesions on the back of the neck, the shoulder and the hands were treated.

CASE 2.—A male patient aged 44 had an enlarged, firm cervical lymph node (Fig. 4) attached to the left body of the mandible. A carcinoma of the lower lip had been treated elsewhere, by irradiation, six months earlier. A roentgenogram showed invasion of the mandible. A jaw-neck resection was done. Four of thirty-two nodes were "positive" for metastatic epidermoid carcinoma. The patient has been free of disease for the past three years.

COMMENT

Surgical treatment of carcinoma of the lower lip controls the early and not clinically apparent lesions, in addition to quickly removing extensive lesions.

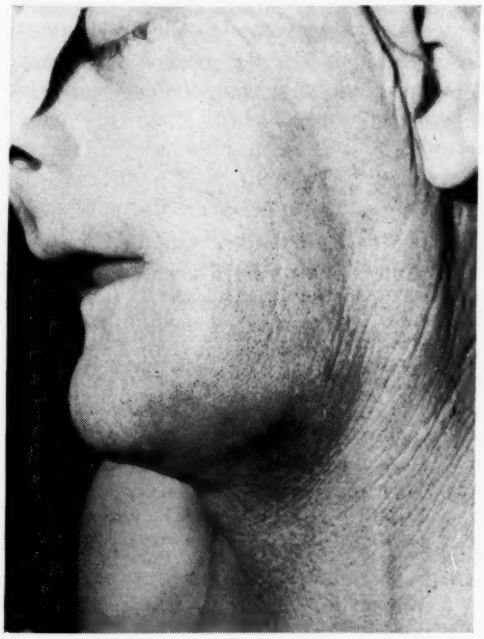

Fig. 4.—Patient 44 years of age with metastases to cervical nodes from carcinoma of lower lip.

Fig. 5.—Appearance one month after jaw-neck dissection.

It makes available a specimen for thorough study as to adequacy of treatment. The wounds are usually healed in a week. Most of the persons treated are outpatients, and the procedure is done with the region under local anesthesia.

Approximately one-half of the lip can be excised and closed without producing much of a deformity. If more of the lip must be sacrificed, replacement with lip tissue from the upper lip (Abbe flap) or the commissure (Estlander flap) will prevent the formation of a narrow, flat lower lip.

Patients who present themselves for treatment of multiple lesions of the lower

lip, or a recurrent lesion in a previously irradiated area, need to have the entire lip resected. The defect can be easily reconstructed at the primary operation with local anesthesia. Reconstruction of the lip is best accomplished by means of tissue taken from the face and neck. The texture and color match is better when facial skin is used to replace the lip excised than when skin from other areas is used. Results of lip reconstruction from pedicle flaps taken elsewhere are not as good. There are two types of lesion in which it is advisable to do a delayed repair:[2] the very extensive lesion, and the lesion that shows a rapid, inflammatory type of growth.

Since cervical metastases develop from epidermoid carcinoma of the lip in only about 6 per cent of cases, it is not necessary to resect the lymph nodes of the neck routinely. The presence of enlarged cervical nodes, however, makes it mandatory that the primary treatment of the lip lesion include neck dissection.

SUMMARY

Carcinoma of the lower lip is best treated by surgical means. Surgical removal of the entire vermilion border of the lower lip prevents the development of new lesions. Neck dissection for metastases to the cervical lymph nodes is necessary in 6 per cent of the cases.

ZUSAMMENFASSUNG

Der Krebs der Unterlippe wird am besten chirurgisch behandelt. Die Resektion der gesamten Grenze des Lippenrots der Unterlippe verhütet die Entstehung neuer Krankheitsherde.

Eine Resektion der Halsweichteile wegen zervikaler Lymphknotenmetastasen ist in 6 Prozent der Fälle notwendig.

SUMARIO

Diz que o carcinoma do labio inferior é feito pela excisão ampla com remoção completa do vermelhão de modo a prevenir o desenvolvimento de novas lesões. Em 6% dos casos é necessaria a dissecção cervical.

RESUMEN

El carcinoma del labio inferior debe ser tratado preferentemente por medios quirúrgicos. La extirpación completa de todo el borde rojo labial previene el desarrollo de nuevas lesiones. En un 6% de los casos es precisa la disección de los nódulos linfáticos cervicales.

RIASSUNTO

Il carcinoma del labbro inferiore deve essere curato con mezzi chirurgici; la sua asportazione previene lo sviluppo di nuove lesioni. Nel 6% dei casi è necessaria l'asportazione di ghiandole cervicali metastatiche.

RÉSUMÉ

The traitement chirurgicale, avec la résection totale du bord vermillon pour la prévention de la récurrence, est préférable pour le carcinome de la lèvre inferieure. La dissection cervicale pour les métastases lymphatiques est nécessaire en 6% des cas.

REFERENCES

1. Paletta, F. X.; Coldwater, K., and Booth, F.: The Treatment of Leukoplakia and Carcinoma *in situ* of the Lower Lip. Ann Surg. 145: 74-80, 1957.

2. Paletta, F. X.: Early and Late Repair of Facial Defects Following Treatment of Malignancy. Plast. & Reconstruct. Surg. 13:95-108, 1954.

Surgical Management of Carcinoma of the Head and Neck

J. J. LONGACRE, M.D., D.A.B.

CINCINNATI, OHIO

"THIS tumor has been taken away, and since the evil has not recurred, it was not a cancer." This fatalistic pronouncement of the famous old French surgeon Boyes, of the last century, cannot be credited today. Indeed, it was failure to remove the malignant lesion thoroughly and completely that gave rise to such statements. Interestingly enough, even today, among the members of an informed profession, some fatalism persists with regard to carcinoma of the head and neck.

As one reviews the oncologic work of the past three decades, during the ascendancy and dominance of radiation therapy in the management of these lesions, one notes that the term "three-year to five-year cure" has been gradually replaced with the term "three-year to five-year arrest." Years were necessary to appraise the results. Now the pendulum swings back to surgical intervention.

At first, this applied particularly to the management of lesions that had recurred after radiation therapy. In 1954 I presented a follow-up study of 107 cases of carcinoma arising from the skin of the head and neck (60 per cent of the tumors were recurrent, following inadequate excision, fulguration or roentgen and radium therapy). Of the patients followed, 33.6 per cent were free from recurrence five to eight years after radical controlled surgical ablation of the tumor; 42 per cent were free three to four years after operation, and 13 per cent were free after two years of follow-up. In this group there were only 6 recurrences. There were no deaths due to the operations, but 4 patients died later of other causes, e.g., arteriosclerosis and coronary disease. Two committed suicide. These episodes occurred before I had learned to brief all my patients, prior to radical operation, as to the final possibilities of reconstruction after the lesion had been ablated. I have found that taking time in advance of the operation, to explain in detail what is to be done and why, is truly rewarding.

For lesions of the floor of the mouth the percentage of salvage is not so great. With more than 1 in 3 patients surviving three or more years, however, radical block dissection *en masse* is indicated.

A drawing is made of the lesion and its location, for purposes of orientation. The radical block resection is planned and performed. Careful sections are now taken all around the periphery of the block, and should there be microscopic evidence of tumor cells, further ablation is done until all the tissue is free of tumor. The wound is then irrigated with liters of saline solution. The instruments, gloves and drapes are changed. The denuded area is covered with split skin dressing, which converts the wound into a healed wound free of granulation, through which one can easily study the possibility of recurrence.

Once the lesion has been excised, it should be observed for six months to a year for the possibility of recurrence. I have

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observed, however, that, although the lesion is arrested and there is a possibility of cure, the massive ablation of lesions about the head and face is followed by a profound psychic depression on the part of the patient. Since these areas are constantly subjected to public gaze, the patient becomes retiring, introvertive and eventually deeply depressed. He avoids contact with his fellow men and eventually seems to withdraw into his own shell, frequently drinking to excess or even contemplating suicide. This is especially to be feared when members of his own family seem to shun and avoid him. For hospitalized patients with extensive resections of the mandible, maxilla, tongue and cheek, plus the associated difficulty in speaking and eating, the problem becomes particularly acute.

This is a type of psychic disturbance that no sedative, shock therapy or psychoanalysis will clear up, because it is a somatopsychic problem. The only thing that tends to tide the affected patient over the interval is the hope that some day, in the not too distant future, his somatic deformity will be corrected. Frequently, a well-made prothesis will aid him during the interval. The only difficulty is that it is hard to obtain a nonirritating paste and one that will hold the prothesis ac-

Fig. 1.—*A*, N. B., aged 64, with malignant melanoma occurring in hairy nevus. Note area from 6 to 9 o'clock, which had been subjected to irradiation. *B*, same patient after radical block resection of cheek and gland of neck in continuity. No evidence of either local or distant recurrence. Primary reconstruction done with rotation flap from neck.

Fig. 2.—*A*, A. S., aged 65, with recurrent basal cell carcinoma of forehead and scalp invading outer table of skull. *B*, same patient after radical block excision of recurrent tumor of scalp, including outer table of skull. Primary reconstruction performed by rotating large temporoparietal scalp flap crossing midline. Split graft applied to pericranium of donor area.

curately in place for more than a few minutes when it is subjected to the muscular movements of the remaining parts of the face, the mucus from the nose and mouth and the moisture when the patient is caught in the rain. A few episodes of the loosening of the prothesis in public are quite enough to send the patient back to the plastic surgeon, demanding that something be done.

In my follow-up of a series of 205 cases of carcinoma in which more than 50 per cent of the lesions were recurrent after previous therapy, including excision, fulguration, roentgen rays and radium, in which meticulous radical surgical ablation (controlled by microscopic frozen section) was carried out over a ten-year period, certain facts are self-evident:

1. The incidence of recurrence was relatively low.

2. Initial split skin dressing of a full thickness graft provided a healed wound, in which it was possible to check for signs of recurrence.

3. The patient's morale was heightened by the surgeon's presenting to him, at the time of consultation, a plan for ultimate reconstruction after an interval following radical ablation of the lesion. This provided him with the thread of hope so necessary to him during the interval of waiting.

4. In the most extensive resections

Fig. 3.—A. S. eleven and one-half years after radical excision of recurrent lesion. Still no evidence of either local or distant recurrence.

(one-third to one-half of the face) the first stage of reconstruction was started, after a short interval, at a distance from the original resection in order to provide tangible evidence of eventual restoration, thereby giving the patient more than a thread of hope.

5. The best possible functional and cosmetic results, obtained with the minimum number of stages and of consequent hospitalization, are largely dependent on careful planning of the reconstruction.

6. In some instances, immediate reconstruction at the time of ablation of the tumor will achieve the best results (see illustrations). At this time the exposure is optional, and contraction and distortion of tissues has not occurred. I have also noted that patients so managed do not show the usual deterioration in morale and are soon back at work, and fitting into their proper niche in relation to their environment.

SUMMARY

In the author's follow-up of a series of 205 cases of carcinoma (in over 50 per cent of which the tumors had recurred after previous therapy, including excision, fulguration, roentgen rays and radium) and in which meticulous radical surgical ablation (controlled by microscopic frozen section) was carried out over a ten-year period, certain facts have been self-evident:

1. The incidence of recurrence was relatively low.

2. Initial split skin dressing or a full thickness graft provided a healed wound in which it was possible to check for recurrence.

3. The morale of the patient was heightened by presenting to him at the time of consultation a plan for ultimate reconstruction after an interval following the radical ablation of the lesion. This provided him with the thread of hope so necessary for him during the interval of waiting.

4. In the most extensive resections (one-third to one-half of the face), the first stage of reconstruction was started after a shorter interval at a distance from the original resection to provide tangible evidence of eventual restoration, thereby giving the patient more than a thread of hope.

5. Reconstruction should be so planned that the best possible functional as well as cosmetic result is obtained with the minimum of stages and of consequent hospitalization.

6. In some instances immediate reconstruction (at the time of ablation of the tumor) will achieve the best results. At this time the exposure is optional and contraction and distortion of tissues has not occurred. The author has also noted that in such cases the patients do not show deterioration in morale and are soon back at work.

RÉSUMÉ

L'auteur présente une série personnelle de 205 cas de carcinomes s'étendant sur une période de 10 ans, dont 50 % de récidives après traitement antérieur ayant compris l'excision, la fulguration, les rayons X et le radium. Les interventions chirurgicales radicales ont toujours été

accompagnées de contrôles microscopiques.

1. L'incidence de récidive a été relativement faible.

2. Les greffes appliquées dès le début ont donné une bonne cicatrisation, en permettant le contrôle d'une récidive.

3. Le moral des patients a grandement bénéficié de la présentation, au moment de la première consultation, d'un plan de reconstruction suivant l'ablation radicale de la tumeur, leur donnant ainsi l'espoir nécessaire durant la période d'attente.

4. Dans les résections les plus étendues (allant d'un tiers à la moitié de la face), le premier temps de la reconstruction a été pratiqué après un intervalle plus court, permettant au patient de se rendre compte par lui-même des possibilités de restauration.

5. La reconstruction doit être exécutée de façon à obtenir des résultats fonctionnels et esthétiques aussi bons que possible avec un minimum de temps opératoires et d'hospitalisation.

6. Dans certains cas les meilleurs résultats sont obtenus par une chirurgie réparatrice suivant immédiatement l'ablation de la tumeur. A ce moment la mise à nu est facultative, la contraction et la déformation des tissus ne s'étant pas encore produites. Les patients gardent dans ces cas un bon moral et sont rapidement aptes à reprendre leur activité.

RESUMEN

A lo largo de 10 años el autor ha llevado a cabo un estudio sobre el curso ulterior de 205 casos de carcinoma (en el 50% de los cuales el tumor se habia reproducido después de terapia previa, incluyendo encisión, fulgaración, radio y radiumterapia) en los que se llevó a cabo una meticulosa extirpación quirúrgica radical (controlada por observación microscópica por congelación); de aquí se deducen con evidencia los hechos siguientes:

1. La aparición de recidiva ha sido generalmente poco frecuente.

2. Cubriendo la herida con un injerto cutáneo (ya se superficial, o ya comprenda todas capas del dermis) se previenen a veces las recidivas.

3. Se eleva la moral del enfermo si en el momento de la consulta se le presenta un plan de reconstrucción después del intervalo que sigue a la ablación radical de la lesión. Esto le da la dosis necesaria de esperanza para el tiempo de espera.

4. En los casos de resecciónes extensas (de un tercio a media cara) el primer tiempo de la reconstrucción debe iniciarse lo más pronto posible después de la ablación original para dar al enfermo ya una prueba de la reconstrucción y con ella estimular su confianza.

5. La reconstrucción debe ser planeada de modo que se obtengan los mejores resultados en un mínimo de intervenciones y hospitalización.

6. En ciertos casos la reconstrucción inmediata (al tiempo de la ablación del tumor) proporcionará los mejores resultados. Es el momento de una exposición mejor y cuando aún no se ha producido distorsión ni contractura de los tejidos. El autor ha notado también que se dan casos de enfermos que no muestran menoscabo en su moral y son por tanto aptos para la pronta vuelta a su trabajo habitual.

ZUSAMMENFASSUNG

Nachuntersuchungen einer Krankenserie von 205 Karzinomfällen, von denen über die Hälfte rückfällige Geschwülste nach vorangegangener Behandlung mit Resektion, Fulguration, Röntgen- und Radiumbestrahlung aufwiesen, und in denen innerhalb eines Zeitraums von 10 Jahren sorgfältige radikale durch Gefrierschnitte kontrollierte chirurgische Abtragung erfolgte, ergaben folgende offensichtliche Tatsachen:

1. Die Häufigkeit von Rückfällen war verhältnismässig gering.

2. Die im Anfang ausgeführte Deckung des Defektes mit einem freien Epidermislappen oder mit einer Ganzhautplastik führte zu einer Wundheilung, die Nachbeobachtungen zur Entdeckung von Rückfällen gestattete.

3. Die Stimmung des Patienten konnte dadurch gehoben werden, dass man ihm zur Zeit der Untersuchung einen Plan vorlegte, der nach einem gewissen Zeitraum nach der radikalen Resektion schliesslich eine Wiederherstellung versprach. Dies gab ihm den Hoffnungsschimmer, der während der Warteperiode so notwendig ist.

4. Bei äusserst umfangreichen Resektionen (ein Drittel bis eine Hälfte des Gesichts) wurde mit dem ersten Stadium der Wiederherstellung nach einem kürzeren Zeitraum an einer von der ursprünglichen Resektion entfernt gelegenen Stelle begonnen, um dem Patienten ein sichtbares Zeichen der endgültigen Wiederherstellung und damit mehr als einen Hoffnungsschimmer zu geben.

5. Die Wiederherstellung sollte so geplant werden, dass die bestmöglichen funktionellen und kosmetischen Ergebnisse mit einer minimalen Zahl von Eingriffen und Krankenhausaufenthalten erzielt werden.

5. In manchen Fällen führt die unmittelbare Wiederherstellung zur Zeit der Abtragung der Geschwulst zu den besten Ergebnissen. Zu dieser Zeit hat man eine freie Wahl der Blosslegung, und Zusammenziehungen und Verzerrungen des Gewebes haben noch nicht stattgefunden. Es ist dem Verfasser auch aufgefallen, dass in solchen Fällen die Kranken noch keine Depression zeigen und sehr bald zur Arbeit zurückkehren.

Dr. Crawford Williamson Long, of Jefferson, Georgia, is generally credited with having performed the very first operation on an under anesthetized patient, in 1841. He did not publish anything at the time, and his claims as a pioneer are disputed by his fellow countrymen. The surgeon's bill for this operation has been published:

James W. Venables,

To Dr. Crawford W. Long, Dr.

To removing one cystic tumor from the back	$2.00
To sulphuric ether used in excising tumor	.25
	$2.25

—*Hamilton Bailey, F.R.C.S. (Eng.), F.A.C.S. F.R.C.S. (Edin.), F.I.C.S. (Hon.)*

Common Problems of Otoplasty

MERTIN D. HATCH, M.D., D.A.B.

PASADENA, CALIFORNIA

THE problems of abnormally prominent ears are many, not only to the physician but to the patient, whose entire psychic and emotional life may be disrupted by being subjected to ridicule and scorn in his early formative years. Such a person, after a time, often begins to feel he is an oddity. He begins to spend his time alone; he avoids social contacts with other people; he becomes morose and thus sets a pattern for an antisocial, neurotic and unhappy life. Today, happily, these problems may be avoided by a well-executed otoplasty before they have had a chance to ruin a person's life.

The earliest attempts at correction of lop ears were mechanical; they consisted of special tightly wound dressings, special caps and certain kinds of glue and like substances, which, it was hoped, would return the ears to a normal position. Such attempts are made not uncommonly even today; but unfortunately they accomplish absolutely nothing of permanent benefit. The only really satisfactory and permanent help is afforded by a corrective plastic surgical operation. The details of the method of correction vary from patient to patient in accordance with his specific problem. Everyone engaged in this kind of surgery develops technics of his own which, in his opinion, yield a happier result.

Historically, Morestin[1] introduced, in 1903, a surgical plan based upon the concept that the deformity of lop ears was due to an overgrowth of conchal cartilage. Unfortunately his procedure is not ideally suitable in the usual case, since a much more common cause of the lop ear deformity is an abnormality of the antihelical fold. For those patients in whose ears the antihelix is well formed, and the prominence is due to an overdevelopment of the conchal cartilage, the Morestin procedure has a definite place in the field of corrective otoplasty even today. When one observes a typical lop ear, however, he sees that the essential deformity really consists of excessive concavity due to the absence of an antihelix (illustration 1, Fig. 1).

Luckett[2] realized this and stated, in 1910, that the usual cause of this deformity was an abnormality of the antihelix and that this could not be corrected by lessening the cephaloauricular angle by Morestin's procedure, since, in his opinion, it did not restore the normal anatomy. He considered the antihelical fold the key to the problem. His basic procedure, by which an attempt is made to reconstruct the missing antihelix by excising a crescent-shaped piece of cartilage and skin (illustration 2, Fig. 1) has been used ever since, with modifications, by the majority of men who have written upon this subject.[3] His procedure utilizes the concept of creating, in the auricle, a surgical hinge with a pivot point in the region of the antitragus and one in the region of the anterior end of the helical rim, thus permitting the ear to be folded obliquely upward and backward. Unfortunately this procedure often causes a definite bulging, rounded angulation of the helical rim which coincides with the anterior end of the cut often permitting, the uppermost

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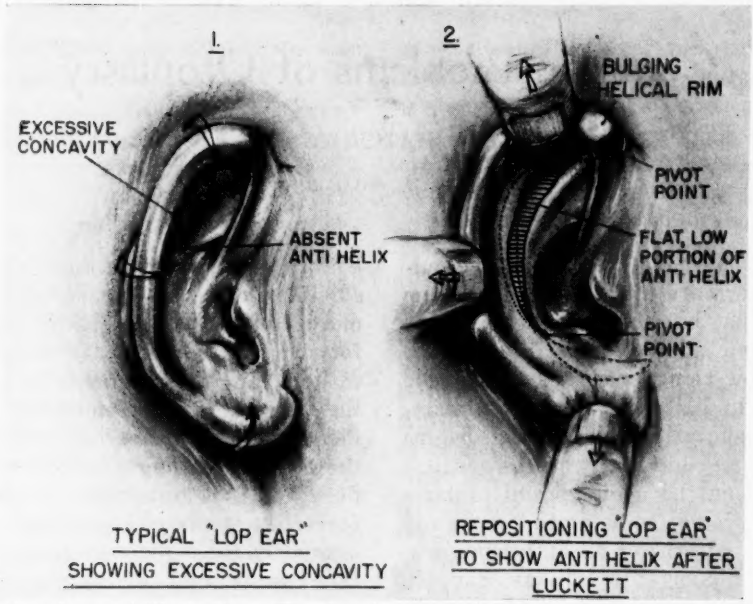

Fig. 1.—First and second illustrations. The drawing is copied from a photograph and shows excessive concavity and loss of antihelical fold. Second illustration shows ellipse of cartilage removed (Luckett) and location of low portion of reconstructed antihelix. Also shown are "pivot points" and "bulging" of the helical rim.

Fig. 2.—Third illustration, showing positioning of three hinges.

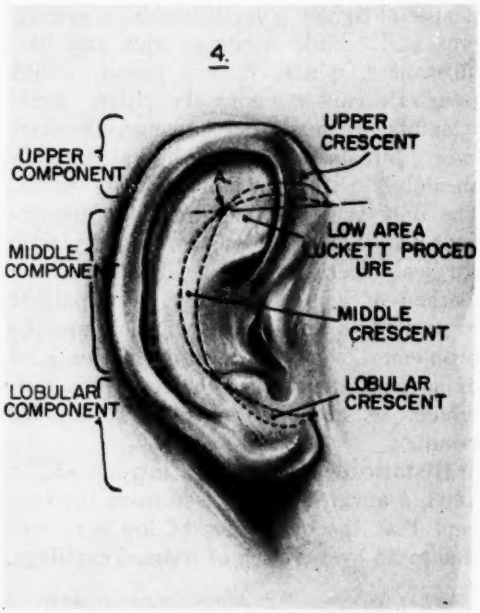

Fig. 3.—Fourth illustration, showing "pivot points" between crescent-shaped pieces of tissue to be excised.

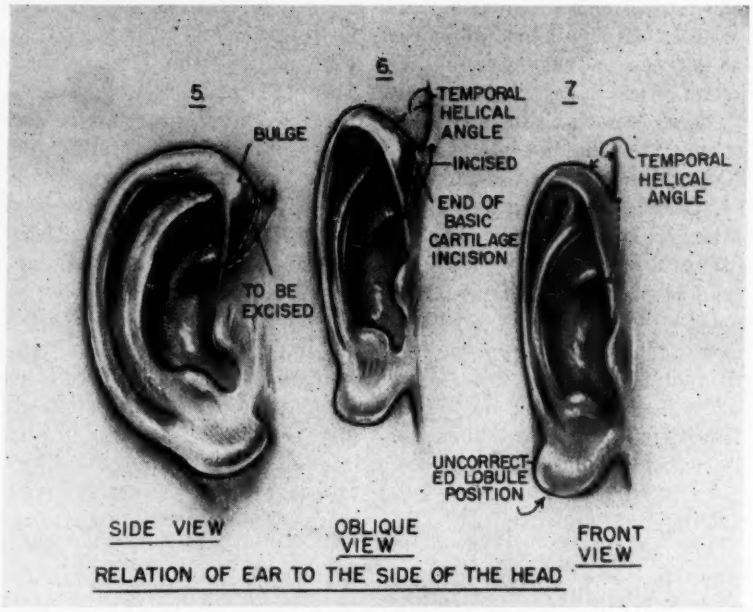

Fig. 4.—Fifth, sixth and seventh illustrations, showing location of "bulge" of helical rim and the projection of the "V" shaped piece of cartilage to be removed in order to lessen the temporal helical angle.

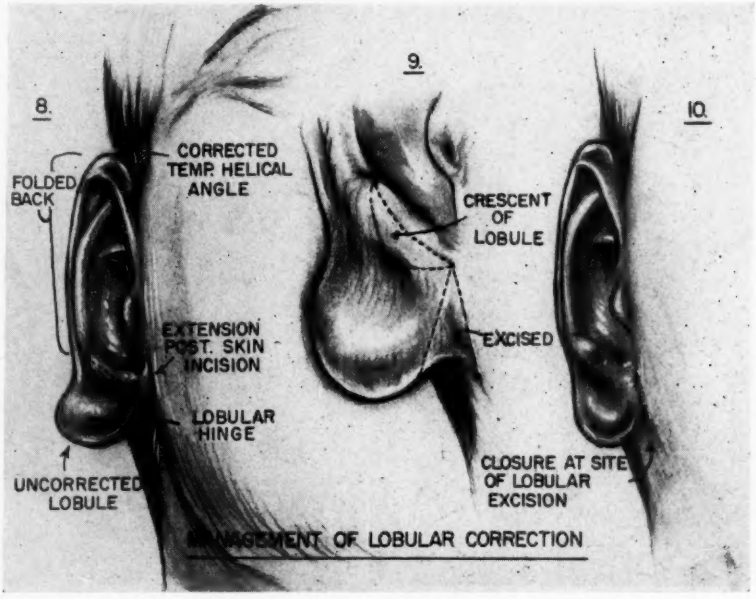

Fig. 5.—Eighth, ninth and tenth illustrations, showing crescent-shaped tissue to be removed posteriorly and the "V" piece of tissue to be removed from lobule.

portion of the ear to tilt outward at an unflattering angle. It also often produces an unwanted flatness and lowness in the region of the end of the inferior antihelical crus. Finally, there is nothing in Luckett's article about repositioning the lobule.

I have developed some modifications of the original Luckett method that may help to produce a more pleasing end result. It is not my intent, however, to suggest that this article will answer all pertinent questions. Indeed, Pierce[4] and Converse[5] have each presented quite different approaches, and each has much to recommend it.

Ideally, to produce anatomic and esthetic normality, the auricular cartilage must be incised in such a manner as to allow the ear to open out in three separate and opposing directions simultaneously. In order to enable such movements to be made effectively, one might envision the creation and utilization of three separate surgical hinges; the upper and lower ones running in a generally transverse direction, while the central one would run in a generally vertical direction (illustration 3, Fig. 2). Many methods now in use do not allow for this three-directional "unfolding," so to speak. In other words, for an acceptable result, the upper component must move in the direction of the vertex of the head; the midportion must move toward the occiput, while the lobular component must move downward toward the upper part of the neck. This repositioning is accomplished by removing three separate, though continuous, crescent-shaped pieces of tissue, two of which are cartilage and one of which is cartilage and fat in the lobule. In this way the "strapped back" appearance of the central portion of some ears after operative treatment can be avoided, because there are no binding points to produce an unduly prominent lobule or a tilted upper portion. These two complications result from the fact

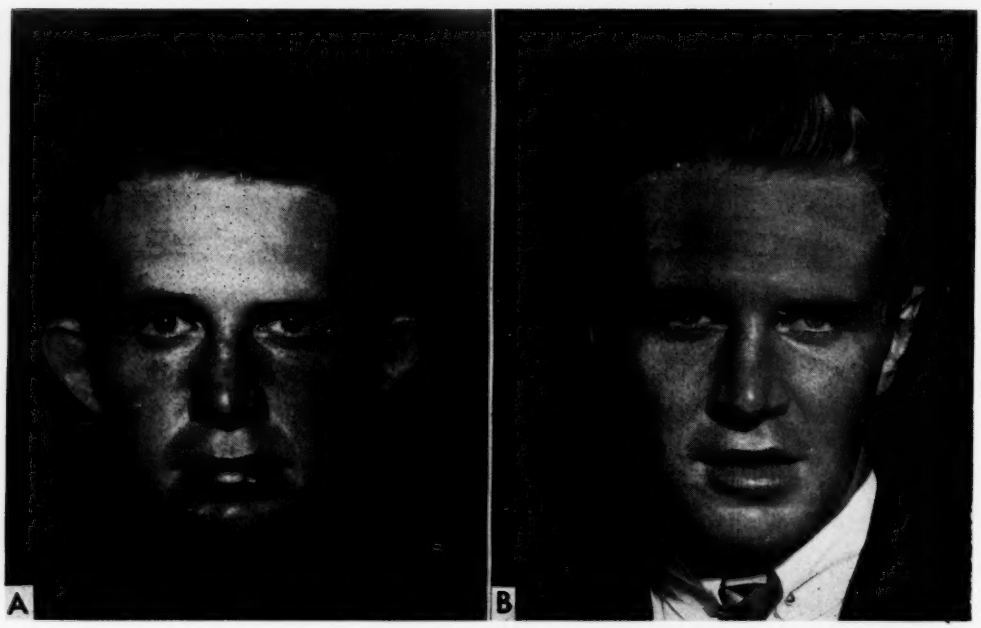

Fig. 6.—Preoperative (*A*) and postoperative (*B*) facial views to emphasize the apparent change in contour.

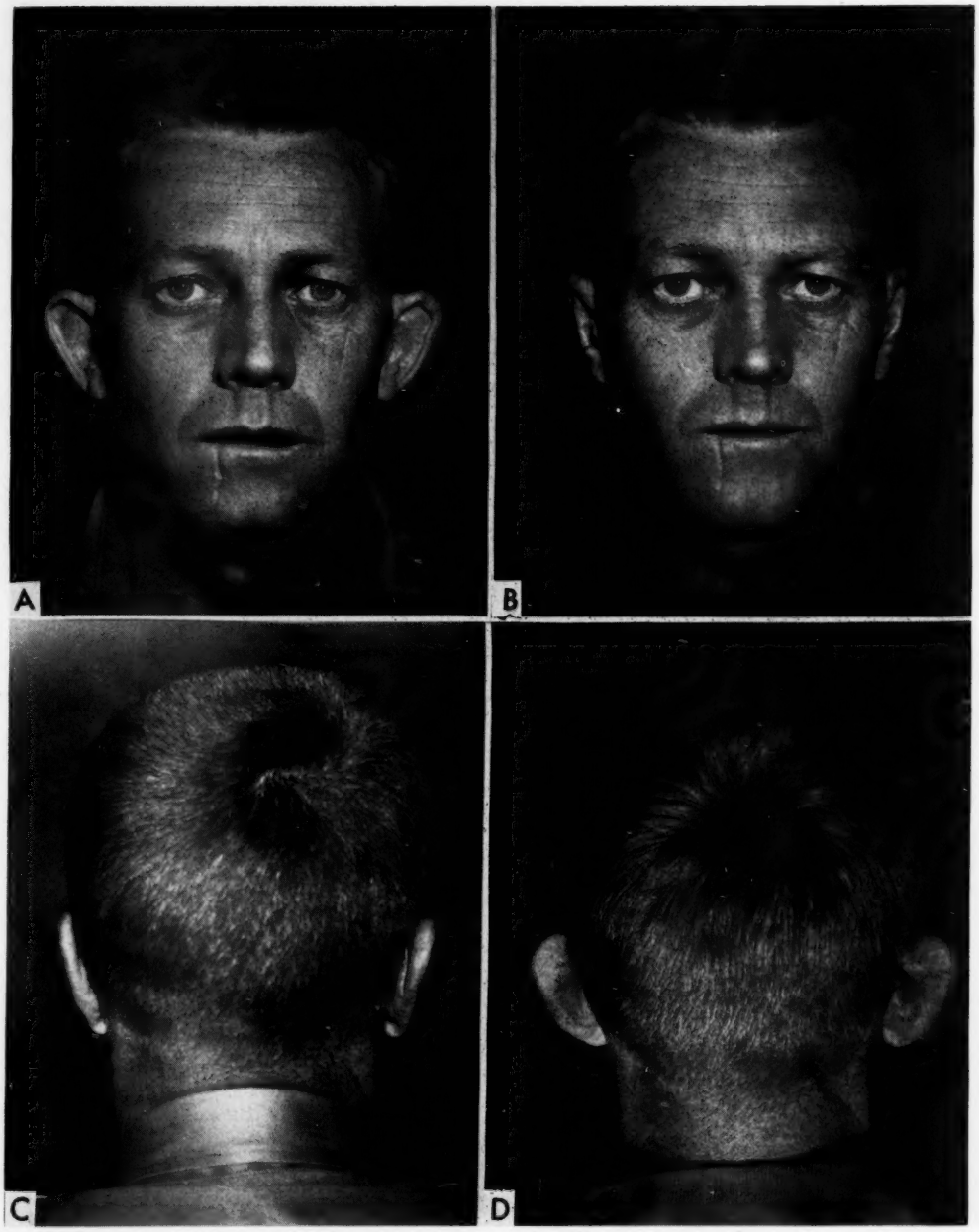

Fig. 7.—Preoperative and postoperative appearance from front *A* and *B* and back *C* and *D* as illustrate apparent improvement of contour of head.

that, when the ear is folded back, the length of the cut edge of the scaphoid portion is insufficient to reach easily around the rounded surface of the conchal portion. This discrepancy of lengths is overcome by cutting the redundant cartilage away in the shape of a crescent. The removal of crescent-shaped pieces of tissue

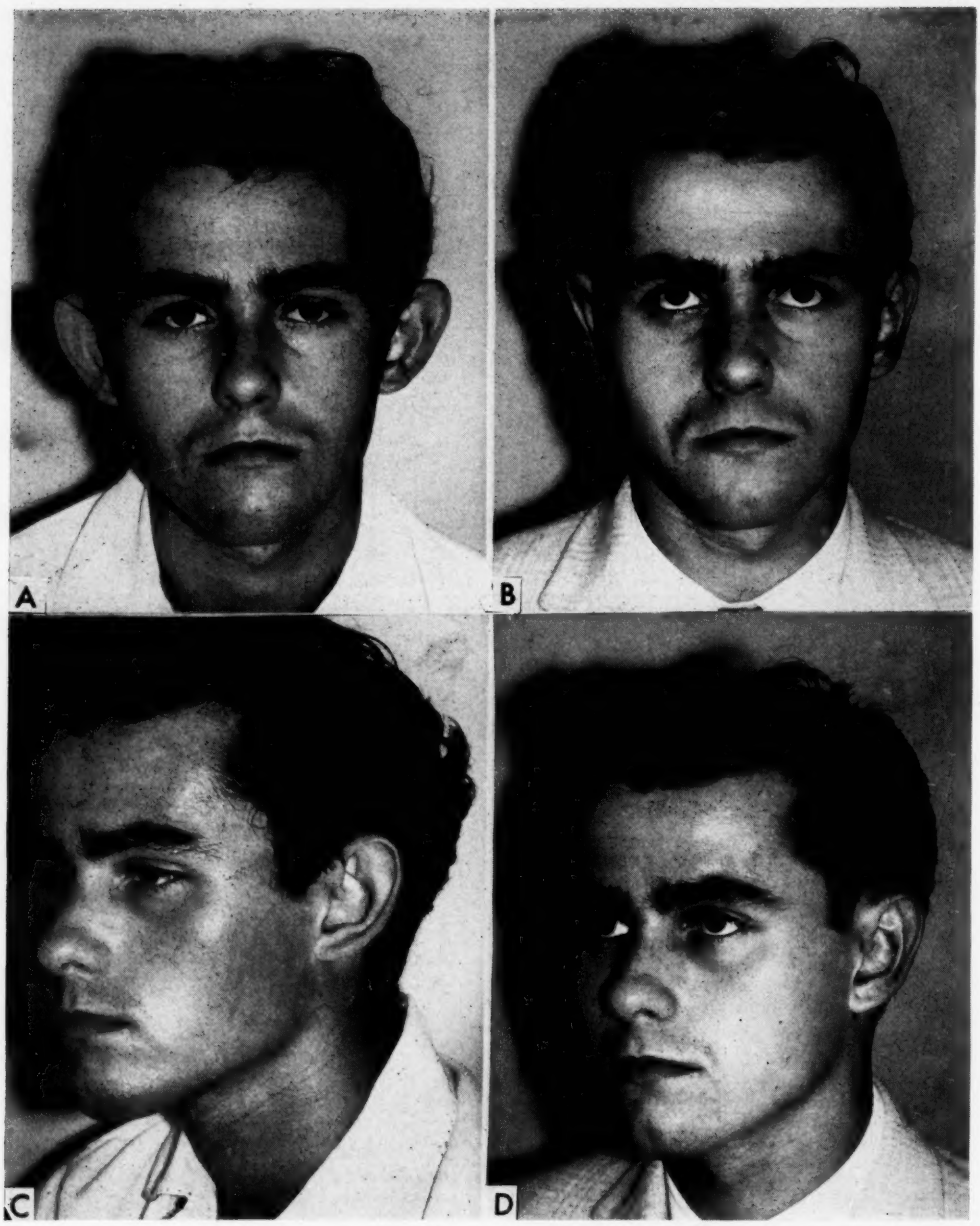

Fig. 8.—Bilateral otoplasty from direct front. Note the contour of the reconstructed antihelical ridge.

in this fashion, also minimizes the flattened area on the antihelical ridge, since, when this three-hinge technic is used, the most important pivot point, *A* can be located more peripherally than it can when only two points are used, as in the Luckett procedure (illustration 4, Fig. 3).

In order to allow the upper portion of

the ear to remain in its corrected position, the cartilaginous framework must be divided in its entirety. If one continues the basic cartilaginous incision to include the rim of the helix, there is the likelihood of creating the aforementioned bulging, rounded angulation. To prevent this, the basic incision in the cartilage is brought far enough anteriorly to be beneath the fold of the helical rim. The incision then turns downward beneath the undermined skin in such a fashion as to divide the rim cartilage completely in an almost vertical direction. This allows the smooth contour of the edge of the helical rim to be maintained and yet permits lessening of the temporal-helical angle. The amount of cartilaginous overlap thus created is then removed (illustration 5, Fig. 4). Should an excessively prominent fold of skin be produced by this maneuver, it can be excised without fear of an objectionable scar. Normally, the elasticity inherent in the skin itself will smooth out this fold. When the upper and middle portions of the ear "setback" have been accomplished, one frequently notices the rounded prominence of what appears to be an excessively large lobule. To correct this, the posterior incision is carried around beneath the lobule and then up to separate the border of the lobule from its attachment to the side of the face. As the lobular roundness is flattened out, its cut edge will be displaced anteriorly over the facial cut and will show at a glance the size of the V that should be removed. The V excision of the redundant lobular tissue should be so placed that the lobule itself will be at the normal 30-degree angle with the side of the head. Closure is accomplished quite easily, once again, without threat of an objectionable scar (illustrations 8, 9 and 10, Fig. 5).

Preoperatively, all patients wash their hair the night before the operation, and again in the morning, with a soap containing hexachlorophene. Children are given endotracheal anesthesia whereas adults are operated on with the region under local anesthesia. The hair is not cut. Three crescent-shaped markings are made upon the skin to delineate the extent of the proposed crescentic cartilage excisions. The ear is folded forward, and the incision is placed well out on the auricle to preserve the normal postauricular sulcus. Undermining of skin flaps is minimal, just enough to permit the cartilage reconstruction. The previously designated sections of tissue are then removed, and the ear will come to rest in a normal position only if all of the cartilage has been divided. This position will maintain itself without buried stitches, and I, therefore, use none. The skin is closed with running nylon; the cartilage is anchored loosely by means of two or three through-and-through nylon mattress sutures, which are tied over sterile foam rubber bolsters. I do not try to evert the cut edges of the cartilage completely, with an idea of getting a wider, rounder antihelical fold,[6] simply because the cartilage does not generally remain, at least for me, permanently in this position. A voluminous head dressing is always applied for about a week and is followed by small dressings as indicated. A stocking-cap type of covering is worn thereafter on the head at night and during naps until the operation is a month old.

In Figure 6, the effect of surgical correction demonstrates the marked change in the apparent shape of the face. This improvement follows almost universally. The patient in Figure 7 shows not only the apparent change in facial configuration but an improved contour when seen from behind. The patient shown in Figure 8 presents not only an improved frontal appearance but a well-shaped antihelical ridge.

SUMMARY

A variation of the Luckett procedure is presented which utilizes certain principles to obtain a more pleasing antihelical fold, a more nearly normal temporal-helical angle and a more acceptable lobular correction than those obtained by other technics in the author's experience.

RESUMEN

Se trata de una variante del procedimiento de Luckett, que utiliza ciertos principos para conseguir un pliegue antihelix de mejor aspecto, un ángulo temporo- helicoidal de tipo más normal y una corrección lobular más aceptable.

RIASSUNTO

Viene presentata una variante del metodo di Luckett che consente di ottenere un antelice di miglior aspetto, un angolo temporoelicale quasi normale e un lobulo soddisfacente.

ZUSAMMENFASSUNG

Es wird eine Modifikation des Luckettschen Verfahrens vorgeschlagen, bei der gewisse Grundsätze zur Anwendung gelangen, um eine besser aussehende Antihelixfalte, einen mehr der Norm entsprechenden Schläfen- Helixwinkel und eine befriedigende Korrektur des Ohrläppchens zu erzielen.

RÉSUMÉ

Une variante de la technique de Luckett est présentée, permettant d'obtenir un meilleur pli antihélical, un angle temporohélical presque normal, et une correction lobulaire plus satisfaisante.

REFERENCES

1. Morestin, H.: Rev. d'orthop. 4:289, 1903.

2. Luckett, W. H.: A New Operation for Prominent Ears Based on the Anatomy of the Deformity, Surg., Gynec. & Obst. 51:635, 1910.

3. Mac Collum, D. W.: The Lop Ear. J.A.M.A. 110:1427, (April 30) 1938. Davis, J. S.. and Kitlowski, E. A.: Abnormal Prominence of the Ears: A Method of Readjustment, Surgery 2:835, 1937. Baxter, H.: Plastic Correction of Protruding Ears in Children, Canad. M.A.J. 45:217, 1941. Coe, H.: Correction of Lop Ears, Northwest Med. 41:126, 1942.

4. Pierce, G. W.; Klabunde, E. H., and Bergeron, V. L.: Useful Procedures in Plastic Surgery, Plastic & Reconstr. Surg. 2:358, 1947.

5. Converse, J. M.; Nigro, A.; Wilson, F. A., and Johnson, N.: A Technique for Surgical Correction of Lop Ears, Plast. & Reconstr. Surg. 15:411, 1955.

6. New, G. B., and Erich, J. B.: Protruding Ears: A Method of Plastic Correction, Am. J. Surg. 48:385, 1940.

Evidence indicates that Hippocrates was alive during the lifetime of Socrates and lived during that remarkable period of history known as the Golden Age of Greece. He was a contemporary of Pericles, the statesman; of the philosophers, Socrates, Xenophon, Plato and Protagoras; of the dramatists, Aeschylus, Sophocles, Euripides and Aristophanes; of the historians, Herodotus and Thucydides, and of the sculptors, Phidias, Polyclitus and Praxiteles.

—*Major*

Complications of Rhinoplasty

I. Skin and Subcutaneous Tissues

MAR W. McGREGOR, M.D., GERALD BROWN O'CONNOR, M.D
SAN FRANCISCO, CALIFORNIA
AND
SHERMAN SAFFIER, M.D.
STOCKTON, CALIFORNIA

A SHORT time ago we published an article entitled *Secondary Rhinoplasties: Their Cause and Prevention.* Unexpectedly, we received many requests for this article. A pertinent comment was made by one of our residents in plastic surgery after we had demonstrated one or two of the points we had tried to make clear in the paper. He said that our having shown it to him clarified the written description. Acting upon this statement, we shall try to elucidate with greater precision, in this and future papers, the complications that may follow rhinoplastic procedures. We may also, from time to time, offer suggestions as to their prevention. This will all be done in the hope that we may be able to add to the armamentarium of the young surgeon starting practice in this field.

Some of these complications have occurred as the result of our own operations. We have chosen to treat the subject by consideration of the anatomic location in which the main deformity occurs.

Skin.—Considerable attention should be given to the type and nature of the skin covering the nose. If this is very thin, with little subcutaneous fat, it will, after rhinoplasty, drape itself over the underlying structures so closely that even minute irregularities will become evident (Fig. 1*A*).

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From the St. Francis Memorial Hospital Plastic Surgery Center.

If the skin is extremely thick, it may not shrink to conform to the underlying bone and cartilage structure one has formed (Fig. 1*B*), especially when heavy, thick, oily skin is encountered on the nasal tip. With this type of skin one should remember that, regardless of the surgical procedure employed, only a limited improvement will occur. This must be thoroughly explained to the patient, even though he sometimes either does not want to hear or will not accept what the surgeon is trying to tell him. For certain persons, especially those with insecure personality traits, it is questionable whether surgical treatment should be considered at all.

Occasionally before the operation, one may encounter reactions in the skin that were not immediately apparent, such as dilated nasal skin capillaries of which the patient is not aware. One must demonstrate this to the patient, or the operation will be blamed for their presence. This dilation is in the form of a local red area or a blotched appearance of the skin on the dorsum of the nose. It has been suggested that the condition might be prevented by keeping the undermining close to the bone and cartilage and by resisting the tendency to handle the skin during the operation (Fig. 1*C*).

Occasionally, when one removes the splint, a small area of local necrosis is present in the nasal tip. This may be due to pressure by the metallic splint edge which has inadvertently been pressed into the skin, or it may be due to a local seba-

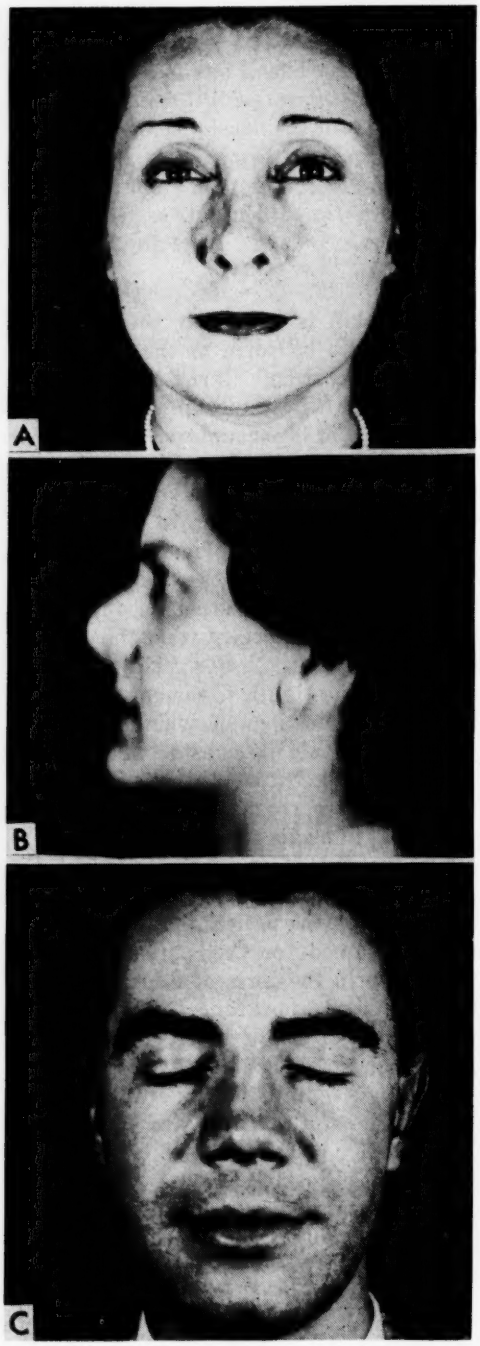

Fig. 1 (*opposite*).—*A*, thin skin draped tightly over uneven bone and cartilage structures. *B*, heavy thick skin of nose that has not contracted to conform to the newly constructed underlying framework. *C*, patches of dilated vessels on skin of nose.

ceous gland infection activated by the underlying surgery (Fig. 2*A*).

We have observed necrosis of the skin on the lateral side of the nasal bones, and in our opinion it was due to an unusual amount of pressure applied to the side of the nasal bones by the thumbs, in an effort to break the nasal bones inwardly. We therefore recommend that the nasal bones should be sufficiently well cut to move toward the midline with ease, and if any external pressure is applied, padding

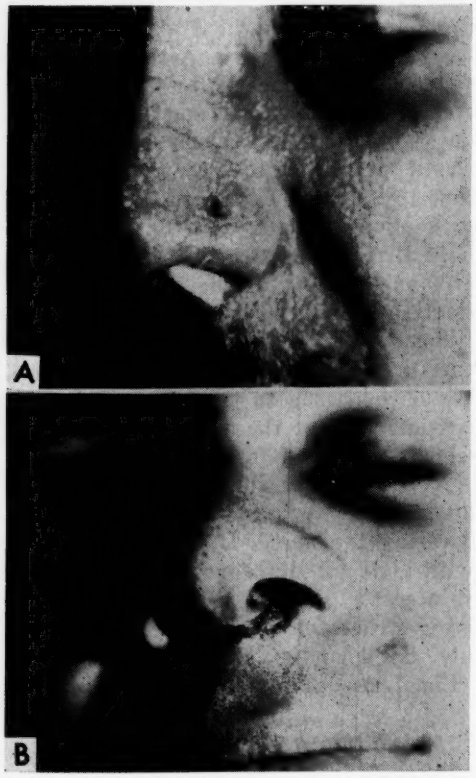

Fig. 2.—*A*, necrosis in skin of nose. *B*, necrosis at base of columella.

should first be applied to the nasal skin. We have also observed necrosis in this area from an unpadded splint that was pinched after its application to create more narrowing of the nasal bones, thus creating greater pressure of the splint against the sides of these bones. In 1 case we observed an area of local necrosis of the skin of the nasal tip caused by an attempt on the part of the surgeon to produce a small tip by excision of the fat and some of the dermis of the undersurface of the skin of the nasal tip. Local necrosis along the edges of the incision has also been observed after pernicious use of tooth forceps. Also, too wide, tight sutures will cut off the columellar blood supply with resulting tissue necrosis (Fig. 2*B*). When the skin is not treated with great care but has undergone some amount of injury, although it may not become necrotic, it may become attached to the underlying framework (Fig. 3*A*).

Not infrequently, olive-skinned brunettes will have some dark pigmentation in the lower lids. This usually is a family trait and should be called to the patient's attention. If it is not, he is likely to notice,

Fig. 3.—*A*, attachment of skin to nasal bones. *B*, pigmentation of skin following rhinoplasty. *C*, Unusual thickness of nose due to hematoma and scar formation. *D*, hematoma beneath skin of glabella.

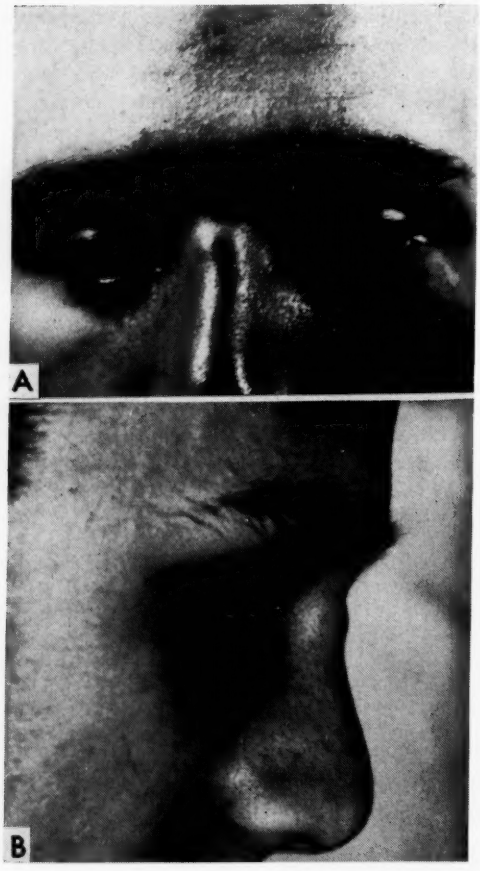

Fig. 4.—Tumor beneath skin in glabella.

after rhinoplasty with local ecchymosis into the lids, a temporary increase in pigment concentration and to insist that this is due to the operation, since he "never had it before" (Fig. 3*B*).

All too frequently we have discovered webs in the vestibule of the nose. Most frequently they are in the apex, extending over to the septum; occasionally, one may be seen bridging between the lateral aspect of the columella and the floor of the nostril. In some cases there is some webbing between the lateral wall of the nostril and its floor. These webs are caused by making the intranasal incisions in the apex either in, or too close to, the reflection of the septal covering onto the nostril. The two inferior webs are usually due to scar contractions when the incisions are extended from their medial and lateral aspects onto the floor. Whenever these webs occur they hold a drop of moisture behind them, thus producing the feeling of a continually moist nose; or the patient may complain of a foul odor due to the accumulated secretion.

Subcutaneous Tissue (for the purpose of this paper, subcutaneous tissue will be defined as the area between the dermis and the bone or cartilage framework of the nose).—By far the most frequent complications occurring in this area are those that result from bleeding into the space and clotting of the blood, with eventual scarring and deformity (Fig. 3, *C* and *D*). In my opinion this can be prevented by improved hemostasis at the time of operation and by adequate external and internal splinting. Dependent drainage at the sites of incision is also valuable in eliminating hematomas.

When the nasal processes of the maxilla are cut, if the bone dust and blood clots are not cleaned out, and if the splint does not ride down onto the cheek far enough to allow a smoothness of pressure in this area, one may encounter a ridge of swelling along the line of the cut in the nasal process of each maxilla.

I have, on occasion, encountered a hard tumor-like swelling in the space between the skin and the nasal bones on the dorsum of the nose (Fig. 4, *A* and *B*). Two of these were in the glabella. One was a mass of semiossified scar tissue that presumably resulted from a collection of rasped bone débris. One was muscle tissue, which presumably had been pushed and rolled up into this area. The third was a cyst located on the lower part of the upper third of the nasal dorsum, which occurred,

according to the patient, shortly after she had blown her nose on the fifth postoperative day. This was due to herniation of the nasal mucosa.

SUMMARY

The authors describe and illustrate certain complications that may arise in various rhinoplastic procedures. This article is Part 1 of a longer and more exhaustive study, and is confined to problems involving the skin and subcutaneous tissue.

The complications here discussed include (1) failure of the skin to shrink to conformity with the underlying bone and cartilage; (2) the preoperative existence of cutaneous reactions, such as dilated nasal skin capillaries; (3) slight local necrosis of the skin in the nasal tip or on the lateral aspect of the nasal bones, either of which may be due to inept surgical handling in the past; (4) dark pigmentation of the lower lids; (5) webs in the vestibule of the nose; (6) hemorrhage into the space between the dermis and the bone or cartilage framework of the nose, with eventual scarring and deformity, and (6) tumor-like swellings in the aforementioned space on the dorsum of the nose.

It is pointed out that many of these conditions may exist prior to treatment without ever having attracted the patient's attention. It is therefore necessary for the plastic surgeon, before consenting to perform an operation, to point them out and explain them thoroughly to the patient, who may otherwise hold him responsible for their presence. On persons with obviously insecure personality traits no plastic operation should be performed at all.

RÉSUMÉ

Les auteurs décrivent et illustrent certaines complications pouvant se produire avec diverses techniques de rhinoplastie. Cet article n'est que la première partie d'une étude détaillée et se borne aux problèmes concernant la peau et les tissus sous-cutanés. Il traite des complications suivantes: 1) défaut d'adaptation de la peau au cartilage osseux sous-jacent; 2) existence de réactions cutanées préopératoires, telle que dilatations capillaires de la peau du nez; 3) légère nécrose locale de la peau du bout du nez, ou sur la face latérale des os du nez, pouvant être, dans les deux cas, la suite d'un traitement chirurgical antérieur inadéquat; 4) pigmentation foncée des paupières inférieures; 5) palmures nasales vestibulaires; 6) hémorragie dans l'espace situé entre le derme et l'os, ou la charpente cartilagineuse du nez, avec cicatrices et déformation; 7) oedèmes d'apparence tumorale dans l'espace sus-mentionné sur le dos du nez.

Il est à souligner que plusieurs de ces complications peuvent être pré-existantes au traitement, sans avoir jamais attiré l'attention du patient. C'est pourquoi il est indispensable que le spécialiste de chirurgie plastique les mette en évidence et les explique au patient avant de consentir à opérer, sans quoi il risque d'en être rendu responsable. Il ne faudrait pas opérer les malades présentant des traits de caractère instables.

RESUMEN

El autor describe e ilustra ciertas complicaciones que pueden surgir en varios métodos de rinoplastia. Este artículo es la primera parte de un estudio mayor y más completo y se limita a los problemas concernientes a la piel y tejido subcutáneo.

Las complicaciones que aquí se estudian son: 1) fallo de la piel para retraerse adaptándose al hueso y al cartílago subyayacentes; 2) existencia preoperatoria de reacciones cutáneas tales como dilatación de los capilares cutáneos; 3) ligeras

necrosis locales de la piel o en la punta de la nariz o en las partes laterales de los huesos nasales que pueden ser debidas a tratamientos quirúrgicos inadecuados anteriores; 4) pigmentación oscura de los párpados inferiores; 5) la existencia de membranas en el vestíbulo nasal; 6) hemorragias entre la piel y el aparato osteocartilaginoso de soporte que pueden originar esfacelos o deformidades; 7) hinchazón pseudotumoral en el ya citado espacio en el dorso de la nariz.

Es preciso tener en cuenta que muchas de estas afecciones pueden ser anteriores al tratamiento aunque hayan pasado desapercibidas. Es por tanto imprescindible al cirujano plástico, antes de decidir una operación, señalar y explicar claramente al enfermo todo ello para evitar una responsabilidad sobre estas complicaciones. En personas con características evidentes de una personalidad incidente no debe practicarse la cirugía plástica.

RIASSUNTO

L'autore descrive alcune complicazioni della rinoplastica. Questo articolo rappresenta la prima parte di uno studio completo sull'argomento ed è dedicata ai problemi relativi alla cute e al sottocutaneo.

Fra le complicazioni viene ricordato: 1) il mancato adattamento della cute al sottostante osso e cartilagine, 2) la presenza di alterazioni cutanee come le dilatazioni capillari, 3) la necrosi circoscritta della cute della punta del naso o delle parti laterali, 4) la pigmentazione scura, 5) l'emorragia negli spazi fra il derma e l'osso o la cartilagine, 6) la comparsa di una tumefazione pseudotumorale nel dorso del naso.

Molte di queste condizioni possono preesistere all'intervento, senza peraltro aver attirato l'attenzione del malato. E', quindi, necessario che il chirurgo, prima di accingersi all'intervento, abbia chiarito questi punti con il suo malato così da evitare di esserne poi ritenuto responsabile. Non si dovrebbe mai procedere ad interventi di plastica in malati che abbiano una personalità chiaramente incerta.

ZUSAMMENFASSUNG

Die Verfasser beschreiben und illustrieren gewisse bei verschiedenen plastischen Operationen der Nase vorkommende Komplikationen. Die vorliegende Arbeit ist der erste Teil einer umfangreichen Untersuchung und beschränkt sich auf die Probleme, die mit der Haut und dem Unterhautzellgewebe zusammenhängen.

Zu den hier erörterten Komplikationen gehören:

1. Das Ausbleiben der Hautschrumpfung zum Niveau des darunterliegenden Knochens und Knorpels.

2. Das Vorliegen von Hautreaktionen wie erweiterte Kapillaren der Nasenhaut vor der Operation.

3. Leichte örtliche Hautnekrose an der Nasenspitze oder an den Seitenflächen des Nasenbeins, die möglicherweise auf frühere unzulängliche chirurgische Behandlung zurückzuführen sind.

4. Dunkle Pigmentierung der Unterlider.

5. Membranbildung im Nasenvestibuel.

6. Blutungen in das Gewebe zwischen Haut und Knochen oder Knorpel der Nase, die schliesslich zur Narbenbildung und Entstellung führen können.

7. Schwellungen in diesem Gewebe am Nasenrücken.

Es wird darauf hingewiesen, dass viele dieser Zustände vor der Behandlung bestehen können, ohne jemals die Aufmerksamkeit der Kranken gewonnen zu haben. Der Chirurg muss daher, bevor es sich zur Operation entschliesst, den Kranken genau mit der Sachlage vertraut machen,

um nicht später für diese Veränderungen verantwortlich gemacht zu werden. An Personen, die deutliche Anzeichen von psychischen Schwierigkeiten aufweisen, sollten plastische Operationen überhaupt nicht vorgenommen werden.

Rhazes (A.D. 900), the Arabian surgeon, is said to have stitched abdominal wounds with harpstrings. He was thus probably the first surgeon to use catgut for such a purpose.

Jean Yperman (1295-1351), a Flemish surgeon, was the great authority on his subject in the Low Countries in the fourteenth century. In his "Chirurgie" he gives a good account of the healing of harelip by means of freshened edges and special sutures. He also describes artificial feeding by a silver tube.

Dr. John Radcliffe (1650-1714) was medical attendant to William III, Mary and Queen Anne. He was the leading physician of his day and left a huge fortune. His name is commemorated at Oxford, his old university, by the Infirmary, library and observatory that bear his name and by traveling fellowships for medical students.

Hume, of Edinburgh, recommended opening the trachea for relief of pseudo-membranous croup in 1756, but it was not until 1782 that John Andree, of London, performed the first recorded operation for this condition. It was not until 1825, when Bretanneau, of Tours, performed tracheotomy for diphtheric croup, that the operation was recognized as a justifiable procedure.

The great Swedish botanist, Linnaeus (1707-1778), was also a physician. He studied medicine in order to win the hand of a wealthy practitioner's daughter, for the father refused his consent to the match until his prospective son-in-law qualified as a doctor.

Dr. Robert Willan (1757-1812) had such confidence in Jenner's method that when his only child had been vaccinated he carried him through the wards of a smallpox hospital.

—Hamilton Bailey, F.R.C.S. (Eng.), F.A.C.S. F.R.C.S. (Edin.), F.I.C.S. (Hon.)

Surgical Correction of Common Congenital Anomalies of the Neck

McCARTHY DeMERE, M.D., F.A.C.S., F.I.C.S.

MEMPHIS, TENNESSEE

CONGENITAL anomalies of the neck did not receive much attention and study by surgeons until about fifty years ago. Even as recently as 1951 there had been little mention of anomalies of the first branchial cleft,[1] but extensive embryologic studies had been done earlier, and Rathke, as early as 1825, had written a comprehensive description of the embryonic development of the neck region.[2] Since that time many excellent comprehensive investigations have been done, and innumerable theories and postulations have evolved as to the origins of the various anomalies. An excellent review of the literature was published by Lyall and Stahl in 1956.[3] Proctor[4] also has presented in an understandable way the development of the various anomalies of the neck.

It is regrettable but true that there is quite an intellectual breach between the erudite embryologist and the clinician who has the responsibility of diagnosing and treating anomalies of the neck. When one tries to correlate the investigations and research of the anatomist and embryologist and the reported cases of the clinician and surgeon, it is easily seen that the operating surgeon has to have a basic and simplified knowledge of embryology so far as the neck is concerned, coupled with an extensive knowledge of the anatomic areas and structures involved.

Simplified Embryologic Background.—During the fourth embryonic week six ridges known as branchial arches are seen in the region of the neck and pharynx: four of these are visible, while the fifth and sixth arches are overlapped. These ridges are separated by grooves called branchial clefts, and they appear on the head of the embryo in the ventrolateral region. The entodermal lining of the rudimentary pharynx covers the inner surface of the arches and bulges outward in the recesses between them to come in contact with the ectodermal covering of the branchial cleft. A thin membrane is thus formed between the arches, consisting of the pharyngeal entoderm, the covering ectoderm and a layer of mesoderm between. It is presumed that this membrane is never ruptured in normal development. In each branchial arch a cartilaginous skeleton, a blood vessel, a large nerve and a muscle component develop. From then on changes rapidly take place, and by the beginning of the seventh week all external traces of the visible arches have disappeared. The first branchial arch has divided into a maxillary and a mandibular process, the maxillary giving rise to the upper lip, cheek, upper jaw, palate and most of the external ear. The mandibular portion gives rise to the lower lip, the lower jaw, portions of the tongue, the malleus and incus. The second arch provides the posterior portion of the external ear, the soft tissues of the upper part of the neck, the stapes and the styloid process. The third arch forms the greater cornu of the hyoid bone, part of the phar-

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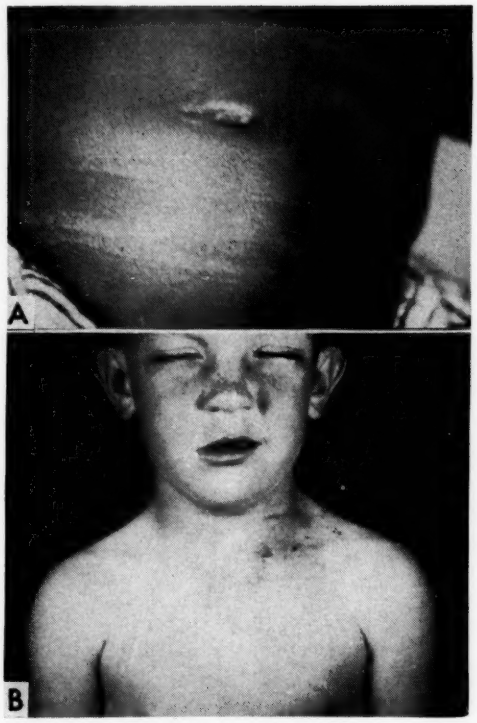

Fig. 1.—*A*, typical thyroglossal sinus usually lies in midline below level of hyoid bone. *B*, analysis of simplified theory of embryonic development shows that defects of second branchial cleft should lie along lower border of sternomastoid muscle in lower portion of neck.

ynx, the common carotid artery, the ninth cranial nerve and part of the pharynx.

Another bit of embryology with which one should be familiar is the development of the thyroid gland. The gland develops as a midline structure, projecting downward from the pharynx, between the first and second pharyngeal arches. This point of origin is seen in adult life at the base of the tongue, at the foramen caecum. About the seventh week the gland starts its migration downward between the first and second arches, between the developing ends of the hyoid bone and down to a position anterior to the larynx, with a lobe on either side of the trachea. As the gland descends, a tube from the base of the tongue is pulled down after it and degenerates when the gland has reached its final resting place; if it remains open, however, the condition known as thyroglossal duct cyst or sinus has developed.

When one analyzes the embryonic development of the structures mentioned, the location of anomalies can be predicted with a fair amount of accuracy. An anomaly of the first cleft thus should be high in the neck, above the level of the hyoid, below

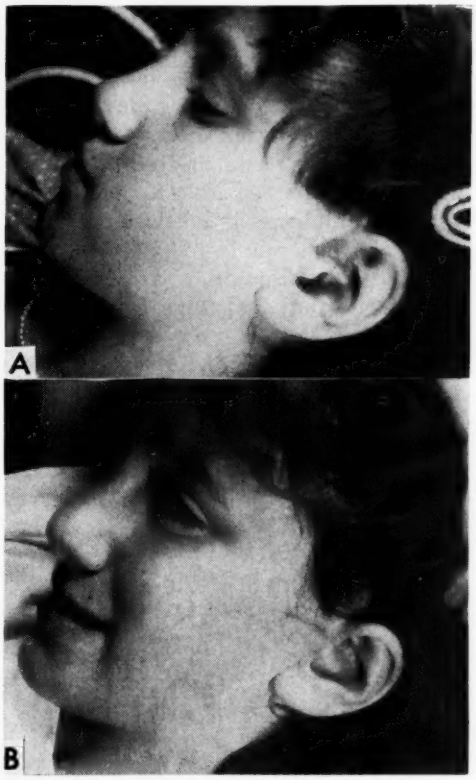

Fig. 2.—*A*, note that even though an anomaly of first branchial cleft usually extends from a point in upper part of neck above level of hyoid bone and below lower border of mandible to an opening into external auditory canal, sinus can extend from preauricular region and make spiral course around external auditory canal, ending near eardrum. This patient underwent seven surgical procedures, including cautery and irradiation. *B*, sinus tract was carefully dissected out and traced in spiral clockwise around external auditory canal.

the lower border of the mandible and sometimes in the preauricular region.

The defects of the second branchial cleft should lie along the anterior border of the sternomastoid muscle in the lower portion of the neck, and the thyroglossal duct cyst and sinus should lie along the midline below the hyoid bone.

TREATMENT AND COMMENT

Even though one can predict in the majority of instances how these deformities will lie, one should keep in mind the fact that an anomaly, by definition, is a "deviation from the common rule," and that in Nature "variation is invariable"; therefore, even though an anomaly of the first cleft usually extends from a point in the upper part of the neck, above the level of the hyoid bone and below the lower border of the mandible, to an opening into the external auditory canal, a similar sinus can extend from the preauricular region and follow a spiral course around the external auditory canal before it joins this structure. Two examples of this have been encountered, one in which the patient had been subjected to seven surgical procedures, including cautery and irradiation. At the time of operation a tract was located and traced in a spiral clockwise path around the external auditory canal until it ended in a cuff of cartilage attached to the canal. In another case the patient had undergone surgical treatment previously on four separate occasions, and at time of operation a tract was found extending spirally around the cartilaginous canal in a counterclockwise fashion.

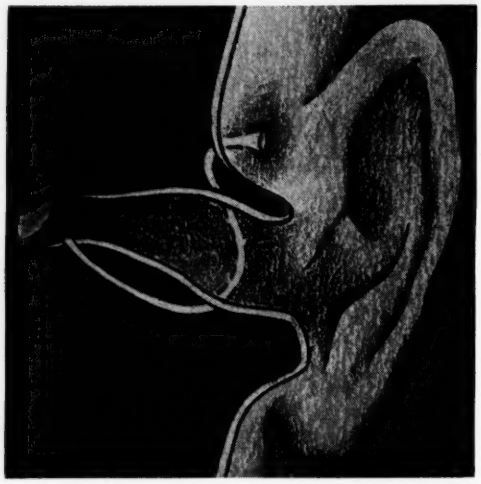

Fig. 3.—Diagrammatic drawing to illustrate spiral course taken by sinus tract.

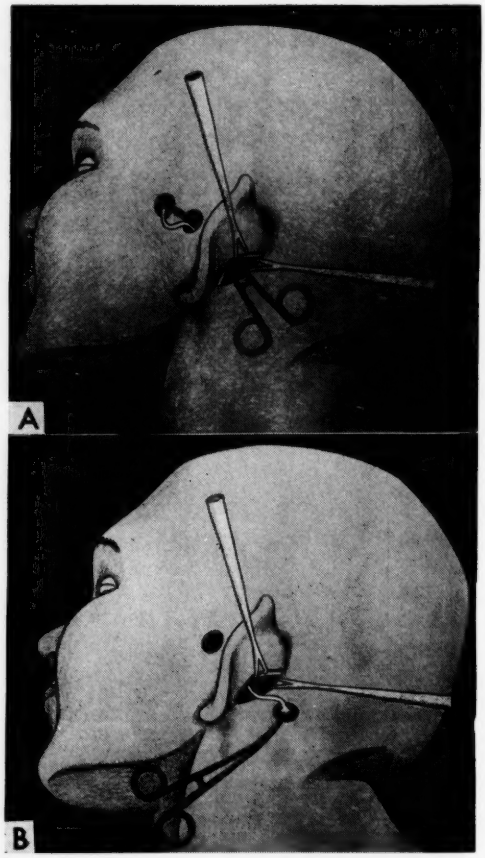

Fig. 4.—*A*, diagrammatic drawing to show method of following sinus tract after it begins spiral course around auditory canal. Second incision is made behind ear. *B*, tract is then brought out through this incision and dissection completed.

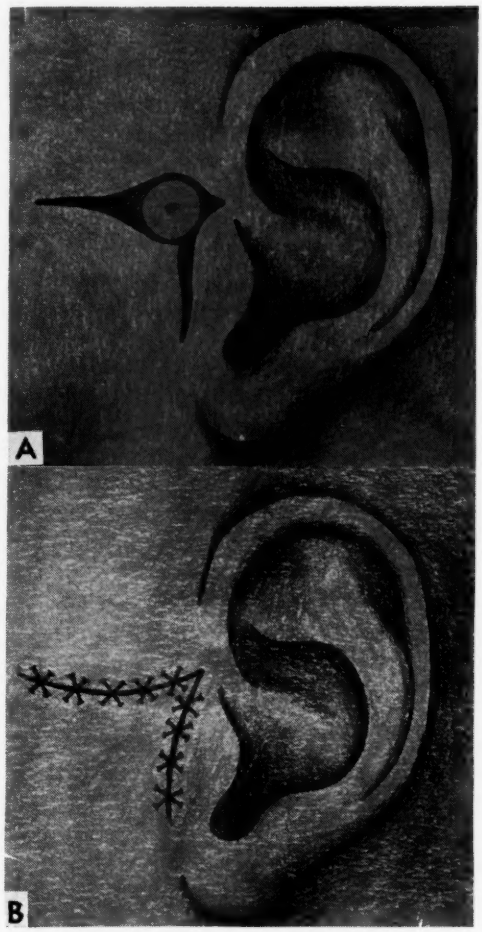

Fig. 5.—*A*, diagrammatic drawing showing excision of preauricular lesion. *B*, flap shifted upward and posteriorly closes defect with minimum amount of operation and scarring.

Even though the remnants of the second branchial cleft should be anterior to the sternomastoid muscle, 1 had a large swelling in the left supraclavicular region which apparently appeared in a period of two weeks. Interestingly, this patient's history revealed a fracture of the left clavicle two months earlier. At the time of operation a tract was found and dissected upward and posterior to the sternomastoid muscle and extended between the internal and external carotid arteries to a point in the infratonsillar fossa. The cyst itself had enlarged rapidly and had become visible because a spicule of bone had eroded through an adjacent blood vessel.

Although the majority of thyroglossal duct cysts and sinuses are located in the midline, several have been found as much as 5 cm. from the midline. In the treatment of all such lesions the cutaneous

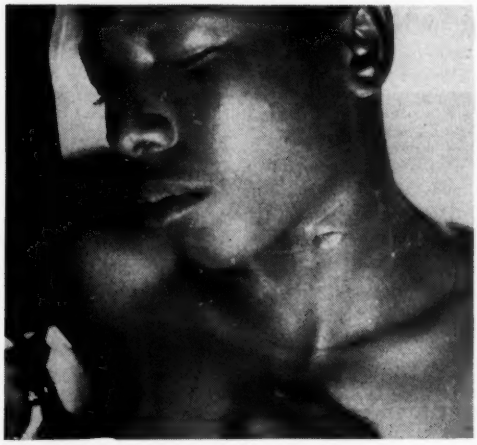

Fig. 6.—Majority of thyroglossal duct cysts and sinuses are located in midline; several, however, have occurred as much as 5 cm. from midline, with tract extending upward through midportion of hyoid bone to foramen secum at base of tongue. No disabilities have followed routine removal of midportion of hyoid bone.

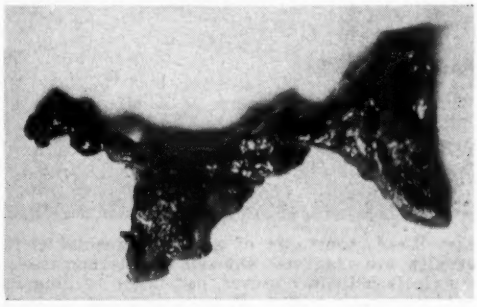

Fig. 7.—Specimen showing entire tract of thyroglossal duct, including midportion of hyoid bone and button of mucosa at foramen caecum.

incision is always made to lie in the folds of the skin, and in the midline the incision is always made transversely. Some surgeons have found it helpful to inject the cyst or tracts with 3 to 4 cc. of a mixture of five parts hydrogen peroxide and one part methylene blue. This is a matter of individual choice, and if all of the excess is removed it may be quite useful.

In dealing with anomalies low in the neck, it is well to remember that its internal connection may or may not extend all the way to the superior aspect of the tonsillar fossa. After the tract has been dissected upward to a point where visibility becomes poor, therefore, a second and higher stairstep transverse incision will be helpful in exposing the anatomic picture. Naturally, in dissecting these tracts, one must be alert to the danger of injuring the large nerves of the neck and the carotid artery; and, in the presence of anomalies of the first branchial cleft, it must be remembered that the facial nerve may lie superficial to the tract.

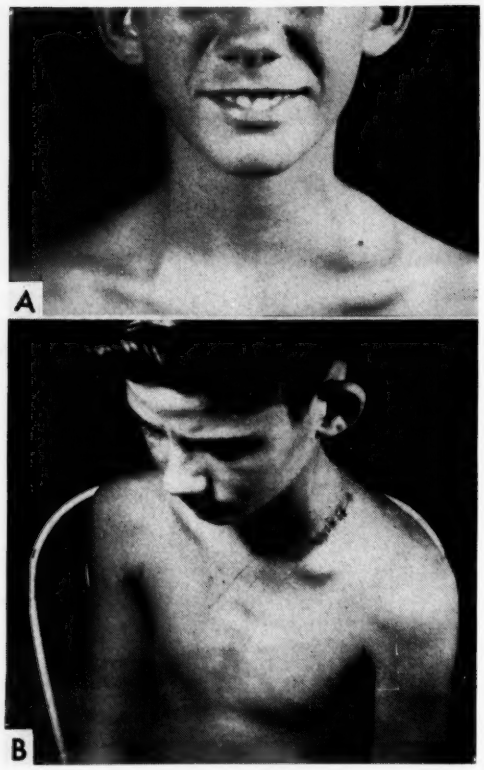

Fig. 8.—*A*, remnants of second branchial cleft usually are observed anterior to sternomastoid muscle; 1 patient, however, had large swelling in supraclavicular region. *B*, tract dissected upward and posterior to sternomastoid muscle, extending between internal and external carotid arteries to infratonsillar fossa.

In dealing with lesions of the thyroglossal duct one must assume that, if the tract extends to the hyoid, it is more than likely that it extends all the way to the base of the tongue. It is a safe rule, therefore, always to remove a section of the hyoid bone in the midline and search carefully for a possible tract leading upward. No disability has been encountered after removal of a portion of this bone, even when no reapproximation was attempted.

SUMMARY

An appeal is made to surgeons who see and treat congenital lesions of the neck to recognize the fact that it is their duty to the patient to familiarize themselves with a simplified form of embryonic development and to keep always in mind that in dealing with anomalies "the unexpected should be expected."

RESUMEN

En este trabajo se hace una llamada a los cirujanos que ven y tratan lesiones congénitas del cuello para que, cumpliendo un deber para con sus enfermos, se familiaricen con un esquema simplificado del desarrollo embrionario de la región para tenerlo siempre presente al estudiar estos enfermos en los que lo inesperado debe ser esperado.

RÉSUMÉ

Il est du devoir des chirurgiens examinant et traitant des lésions congénitales du cou de se familiariser avec une forme schématisée de développement embryonnaire et de ne jamais perdre de vue que dans les anomalies il faut toujours s'attendre à l'imprévisible.

RIASSUNTO

I chirurghi che vedono e curano le lesioni congenite del collo debbono famigliarizzarsi con i problemi dello sviluppo embriogenetico e ricordare sempre che, nel campo delle anomalie, può accadere qualunque cosa.

ZUSAMMENFASSUNG

Der Verfasser appelliert an die Chirurgen, die Gelegenheit haben, angeborene Erkrankungen des Halses zu beobachten und zu behandeln, sich mit einem einfachen Schema der embryologischen Entwicklung vertraut zu machen und niemals zu vergessen, dass man bei Anomalien "das Unerwartete erwarten muss."

REFERENCES

1. Byars, L. T., and Anderson, R.: Anomalies of the First Branchial Cleft, Surg., Gyn. & Obst. **93**:755, 1951.
2. Rathke, H., I.N.: Nova Acta. Phys. Med., Bonn, 1828. Cited by Meyer, H. W.: Ann. Surg. **95**:1, 1932.
3. Lyall, D., and Stahl, W. M.: Internat. Abst. Surg. **102**:417, 1954.
4. Proctor, B.: Laryngology **65**:355, 1955.

In the summer, too, he (Semmelweis) was to be grieved by news from Kiel. Michaelis, who had been one of the first to try his method and give it his approval, committed suicide. He had delivered, in the summer of 1847, a young cousin of whom he was very fond. Shortly afterward she developed the fever and died. In the light of the knowledge he had received from Vienna, Michaelis realized that he alone had been responsible for her death, that he had brought the deadly infection to her with his own hands. This along with the knowledge of how many women he must have infected in the same way, began to prey upon his mind. Michaelis cracked under the strain and one day he thrust himself beneath the wheels of a train in Hamburg.

Semmelweis himself had known the agony of the same terrible thought. When he realized the truth concerning the conveyance of puerperal fever, he had to realize as well that he had sent many a woman to her death. "God only knows the number of women whom I have consigned prematurely to the grave," he wrote, "for I have occupied myself with the cadaver to a degree reached by few obstetricians." He could enter fully into the horror that had possessed Michaelis.

—*Slaughter*

Malreduction, Malposition and Malunion in Facial and Mandibular Fractures

N. JOHN WILDE, M.D., F.A.C.S., F.I.C.S., D.A.B.

FRESNO, CALIFORNIA

WITH increased mechanization, mandibular and facial fractures are increasing steadily. A significant number of patients are seen months after an accident who have unwarranted complications of such injuries. It might be wise at this time to reevaluate the current methods of treatment and to reemphasize some of their basic principles.

Although the same general principles apply to fractures of the face and mandible as apply to other fractures, there are several factors that require consideration. In fractures of other bones the tolerance of malreduction, malunion and malposition is considerable, and may, therefore, cause little or no interference with function. Also, appearance elsewhere is of less concern than in the face.

Malreduction, malposition and malunion in facial and mandibular fractures may be associated with any of the following complications:

1. Malocclusion
2. Diplopia
3. Esthetic handicaps
   a. Asymmetry of face
   b. Flatness of cheek
   c. Inequality of orbits
   d. Nasal irregularities
4. Numbness of cheek and nose
5. Lack of feeling in teeth
6. Pain due to pressure on sensory nerves
7. Inadequate excursion of the mandible
8. Chronic sinusitis, due to poor drainage of sinuses
9. Obstruction to breathing
10. Facial paralysis
11. Nasolacrimal duct obstruction
12. Growth deformities
13. Dysfunction of the temporomandibular joint.

In some instances these complications can be corrected wholly or partially. In others the injury is such that the golden opportunity was lost at the time of the original treatment.

Most complications of this type of injury are due to improper reduction and fixation of mandibular fractures. There is a lack of appreciation of the importance of proper occlusion, not only for chewing after recovery but as required for proper treatment of the injury. There has been indiscriminate use of Kirschner wires and interosseous wiring, and lack of adequate intermaxillary fixation. It is indeed fortunate that the establishment of proper occlusion brings about the correct reduction of mandibular fractures, and, as a consequence, these complications are avoided. Therefore, the correct wiring together of the jaws is a necessity.

There are several technical points to be considered. One must know what constitutes proper occlusion; that the upper teeth overlap the lower teeth, not just anteriorly but posteriorly also. One should know the manner in which the cusps of the bicuspid teeth and molar teeth inter-

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Fig. 1.—*A*, malreduction of mandibular fracture. Patient unable to close mouth. *B*, roengenogram of mandible of same patient. Note depression of anterior half of mandible, due to malposition and lack of proper fixation.

digitate. In the use of materials, I would urge the application of arch bars in most cases as preferable to loop wiring. The use of arch bars facilitates the application of intermaxillary fixation and, more important, by the use of elastic traction, the directional pull of which may have to be readjusted frequently for the first few days, badly displaced bone fragments can be moved into proper occlusion. The wires holding the arch bars to the teeth must be tight and placed about the teeth in the proper manner; for example, with the front teeth, one cannot depend on the contact points between the teeth for retention. These teeth will shift slightly; the wires will slip; the arch bars will loosen, and proper fixation is thereby lost. Rather, the wires should be placed below the greatest circumference of the teeth. This is not a problem with the posterior teeth, but in dealing with the anterior teeth it means that the wire has to be placed below the gingival margin and beneath the cingulum on the lingual surface of the tooth.

The most common complication is malocclusion. Too often this is glossed over as unimportant. Associated with it may be one or all of the following complications:

1. Inadequate excursion of the mandible
2. Asymmetry of the face
3. Pain
4. Dysfunction of the temporomandibular joint.

Anyone who has had a restoration placed in a tooth that is even a shade too high will recall how uncomfortable it was and how difficult it was to masticate. How much worse it is to have a segment or the whole bite off! The lack of balanced and centric occlusion will cause abnormal stresses and strains on the temporomandibular joints, which will often lead to deterioration of the temporomandibular joint.

Patients with complications will seek further treatment, which in most cases will require re-creation of the original fracture. The presence of motor and sensory nerves, muscles of expression, muscles of mastication, teeth and large vessels

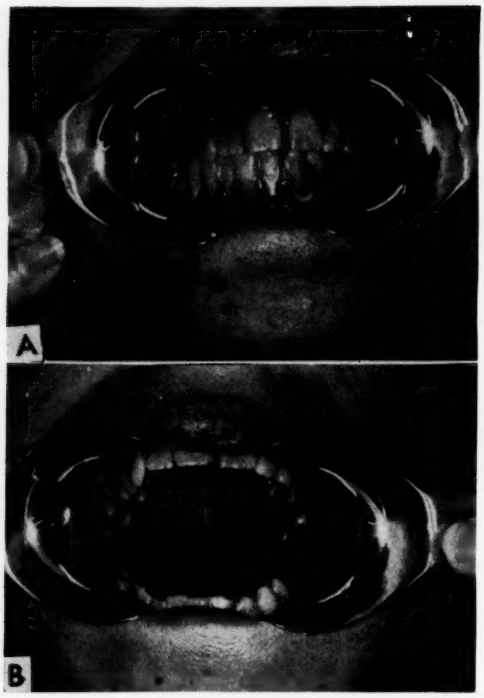

Fig. 2.—*A*, restoration of occlusion in patient in Figure 1 after bilateral osteotomy and reduction and fixation by use of arch bars. *B*, normal mandibular excursion following treatment.

calls for a finesse and precision of technic not required in re-creating fractures in other bones. The presence of scar tissue and the distortion of structures by the original injury further complicate the picture. I have selected a few cases that will illustrate the major points mentioned.

REPORT OF CASES

CASE 1 (Fig. 1).—The patient, a boy, was injured five months prior to the time when the accompanying pictures were taken. Facial asymmetry, malocclusion and inadequate mandibular excursion for eating, talking and facial expression were obvious. Study of the patient's roentgenogram (Fig. 1*B*) will show the cause of this result. There is no intermaxillary fixation, and there is only a single loop of wire at the fracture site. There is a bare chance that a satisfactory result might have been obtained if cross-wiring had been used instead of a single loop (Fig. 1*B*). With adequate teeth present, however, arch bars should have been placed and intermaxillary wires used.

To bring about as much correction as possible in this boy's condition, a bilateral osteotomy with repositioning of the fragments was required. In conjunction with this, arch bars were applied to both upper and lower jaws, and firm intermaxillary wiring was applied. Figure 2 shows the boy's condition at the time of writing.

CASE 2 (Fig. 3).—Six months prior to the time these pictures were taken, this girl suffered bilateral subcondylar fracture dislocations of the temporomandibular joints and a midhumeral fracture. The fracture of the humerus was treated, and very nicely, but the mandibular fractures, though recognized, were not thought to require treatment. As can be seen, the child had resulting ankylosis of the mandible, with pronounced retroposition. Not only is this a most disabling condition at present, but one can readily appreciate the growth deformity that would result if it were left untreated. At operation, both temporomandibular joints were exposed. Only fragments of the head of the condyle could be found on the left side, and these were removed. On the right side, the head of the condyle was present but was impacted. This was disengaged. Arch bars were then applied, and the teeth were wired together for one month. As can be seen, the retroposition was corrected, and there is no straining to open the mouth, Fig. 3, *C* and *D*.

The next largest group of complications in facial-mandibular fractures are those due to the zygoma. Complications associated with malposition of this bone may be numbness of the cheek and the side of the nose, pain, diplopia, flatness of the cheek, inequality of the orbits, chronic sinusitis, and/or lack of normal ocular mobility. These things are easily appreciated when one thinks of the proximity and relation of the zygoma to the maxillary sinus, the infra-orbital nerve, the floor of the orbit and the attachment of the ocular muscles. It is because of these relations that every effort must be made to treat this fracture at the time of the

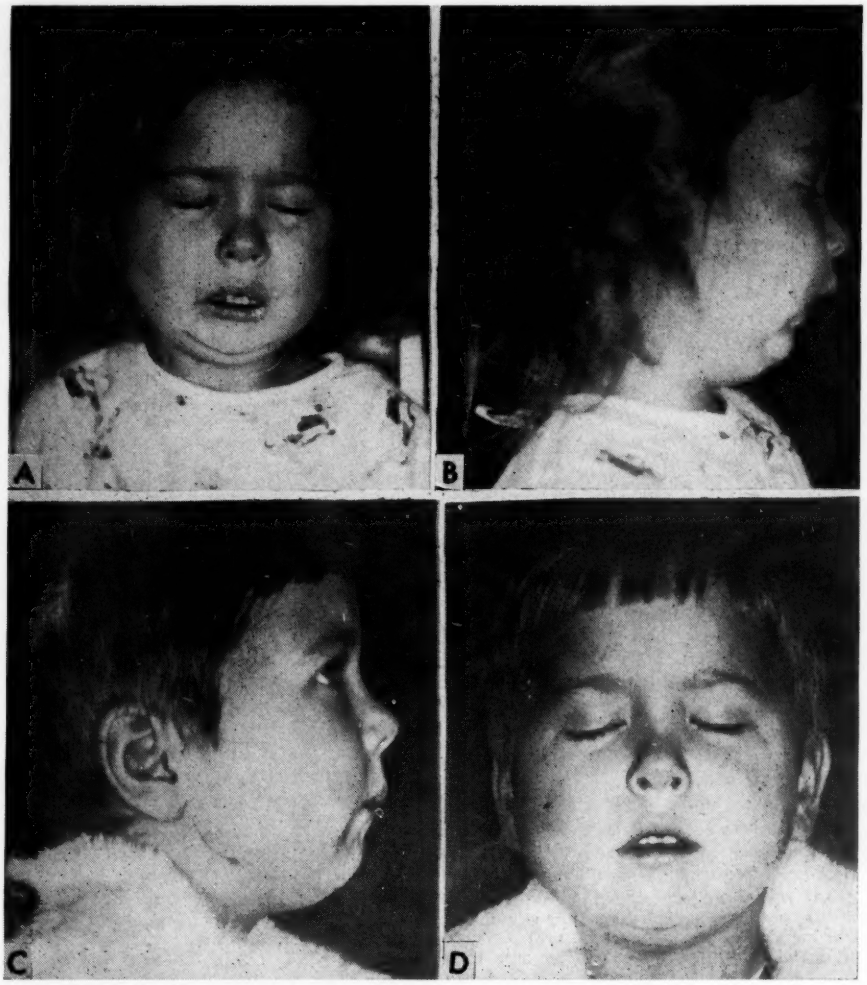

Fig. 3.—*Upper left,* girl aged 4 years who six months earlier had had bilateral subcondylar fracture-dislocations of temporomandibular joints. Note ankylosis of mandible despite great effort to open mouth. *Upper right,* retrognathia due to unreduced fracture. *Lower left,* retrognathia corrected, with bilateral open reduction of fractured condyles and intermaxillary fixation with arch bars. *Lower right,* photograph demonstrating that child can open mouth without effort.

original injury. This can be done by direct wiring (Fig. 4*A*), elevation by means of an instrument placed behind the body of the zygoma, either through the mouth or from the templar region (Fig. 4*B*), the use of Kirschner wires (Fig. 4, *C* and *D*) and, in rare cases, intra-antral packing. The last-mentioned is a procedure of last choice, because chronic purulent sinusitis and fistula may develop. To re-create a zygomatic fracture at a later date is difficult. It is not an easy matter to chisel the zygoma loose along the infra-orbital fissure and the lateral orbital wall. At the same time, one must avoid injury to the ocular muscles, the eye and the associated

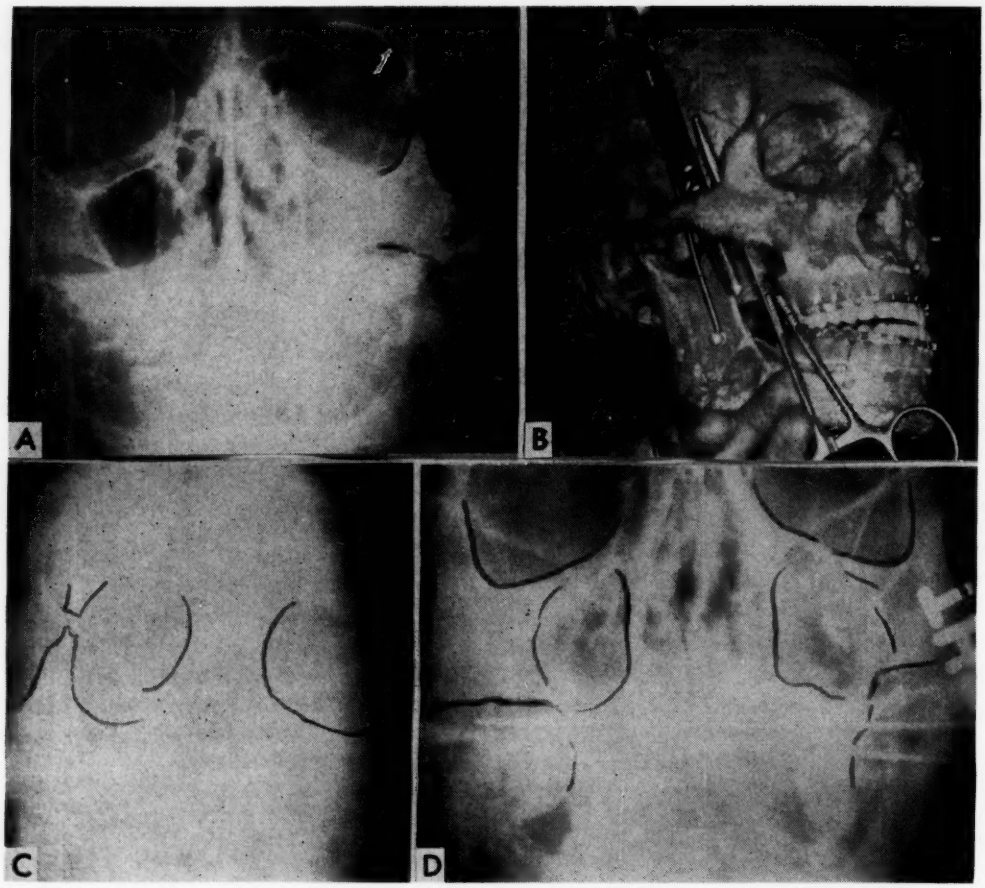

Fig. 4.—*A*, roentgenogram showing multiple wiring of arch and body of zygoma for reduction and fixation. *B*, photograph showing that zygomatic fractures can be reduced by elevation through an intraoral incision or through a temporal incision within the hairline. *C*, roentgenogram showing degree of downward displacement of zygoma in a case where fixation by Kirschner wire was indicated. *D*, reduction and fixation obtained with Kirschner wires.

neurovascular structures. Here too, the presence of scar tissue and distortion by the original injury further complicate the procedure.

CASE 3 (Fig. 5).—The patient, a girl, showed the complications of an upward displacement of the zygoma. There were exopthalmia, lack of normal ocular mobility and irregularity of the orbital borders. To improve the girl's condition as much as possible at this time becomes a rather formidable procedure. The entire zygoma must be chiseled free and displaced downward. As scar contracture occurs, there is a tendency for the bone to be pulled upward again. This can be mitigated by placing cartilage, bone, or some inert material between the bone fragments to maintain position. As can be seen, there was acceptable improvement in the position of the bone (Fig. 5*B*). An even more difficult problem now will be to restore some semblance of ocular muscle balance.

CASE 4 (Fig. 6).—The patient, a girl, showed the usual complication of a malreduced zygomatic fracture; that is, inferior displacement, with dropping of the eye and flattening of the cheek. In addition, this particular pa-

tient had numbness over the distribution of the infraorbital nerve. This type of fracture should be reduced immediately, if at all possible, not only to place the bone in a normal position but to remove the pressure on the infraorbital nerve.

At a later date improvement in the bony contour is possible, but full correction is not often obtained. This is best accomplished with a bone or cartilage graft or implantation of an inert substance. In many cases, scarring and fibrosis of ocular muscles and periorbital tissues prevent return of the structures to normal. Thus, the final result is less than that which could have been obtained had correct reduction of the bone been accomplished at the time of the original injury (Fig. 6*B*).

Fig. 5.—*Above*, upward displacement of eye due to malposition of zygoma. *Below*, improvement in level of eye after re-creation of fracture and correction of malposition as far as possible.

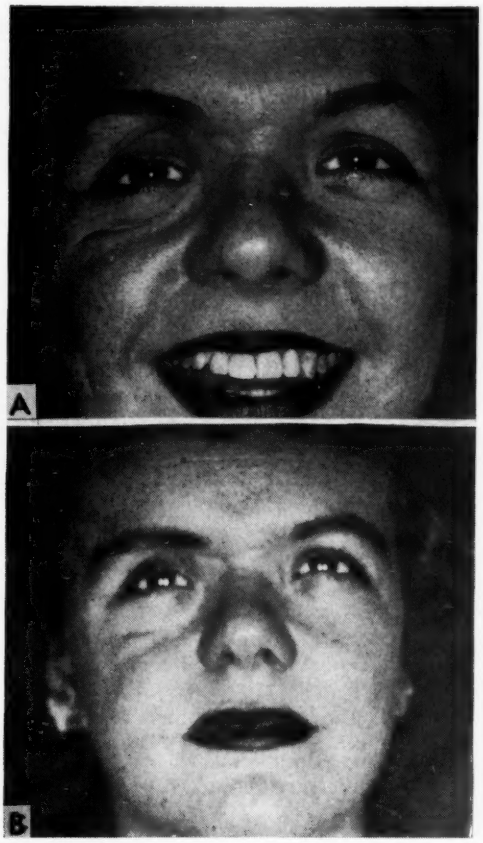

Fig. 6.—*Above*, downward displacement of eye due to malreduction of zygomatic fracture. *Below*, partial restoration of eye level by use of preserved cartilage graft beneath eye on orbital floor. Presence of scar tissue involving orbital contents prevents complete restoration.

SUMMARY

A substantial number of patients are having unwarranted complications of facio-mandibular fractures. Many of these complications could be avoided if those who treat such injuries reviewed the principles involved and the methods of treatment that have proved themselves over many years.

RIASSUNTO

Molti malati con frattura della mandibola vanno incontro a complicazioni. Alcune di esse potrebbero essere evitate con una più completa conoscenza delle lesioni e dei metodi migliori di cura.

ZUSAMMENFASSUNG

Eine erhebliche Anzahl von Patienten erleidet unnötige Komplikationen von Gesichts- und Kieferbrüchen. Viele dieser Komplikationen liessen sich vermeiden, wenn die behandelnden Ärzte sich mit den Grundsätzen der Therapie solcher Verletzungen und mit den langbewährten Behandlungsverfahren v e r t r a u t machen würden.

RESUMEN

Un número importante de lesionados de fracturas maxilofaciales, quedan con complicaciones. Muchas de tales complicaciones podrían ser evitadas si los médicos que tratan las fracturas revisaran los principios concernientes al tratamiento y que han sido bien probados a lo largo de muchos años.

RÉSUMÉ

De nombreaux cas de fractures faciomaxillaires prêsentent des complications injustifiables dont beaucoup pourraient être évitées si le médecin traitant s'en tenait aux principes et aux méthodes ayant fait depuis longtemps leurs preuves.

The future of antibiotics will bring many new agents into medical use. However, there will be no truly outstanding advances unless certain existing problems can be solved.

The first problem is that of drug-resistance, which has resulted in the establishment of resistant strains of bacteria and their perpetuation in the general population and in hospitals. Methods for the suppression of resistant strains include use of multiple chemotherapy and search for more effective antibiotics, with reduced probability of mutations to resistance.

A second problem is the comparatively ineffective nature of most antibiotics in the treatment of virus and fungal diseases. The nature of virus as intracellular parasites presents special obstacles. Control of fungi is not associated with any insurmountable difficulties. Progress is now being made with certain classes of antifungal antibiotics.

Some of the potentially useful antibiotics are unduly toxic, and others in common use may give rise to allergic responses, as is well known. These disadvantages are subject to modification and control in some instances.

A more rational chemotherapy requires better knowledge of the mode of action of drugs. Some aspects of the manner in which existing and future antibiotics may act on microorganisms will be discussed.

—Gryson

Radical Operation for Intraoral Carcinoma*

HOKE WAMMOCK, M.D., F.A.C.S., D.A.B.**

AUGUSTA, GEORGIA

THE purpose of this paper is to discuss some of the factors encountered in lesions arising in the oral cavity and related structures, namely, the lip, the buccal mucosa, the floor of the mouth, the gingival margin and the tongue, for these are lesions of epidermal origin. Malignant neoplasms of epidermal origin are the most common type one has to deal with in this particular area. The incidence of malignant tumor in this area is approximately 30:100,000. Because of this low incidence, the general practitioner may encounter an occasional case, and the radiologist or the surgeon only a few cases; in a good many instances the number may be too small to give one sufficient experience to cope with the particular situation.

This presentation will not be a statistical survey but will deal with factors that must be contended with in the application of surgical principles for this group of patients. It will be an expression of my own point of view gained by many years' experience and from that reported in the literature. My experience is based upon the use of a variety of therapeutic procedures, including radiation, surgical intervention or a combination of the two, for in some instances they may complement each other. There are, of course, limitations to the use of all procedures; I propose, however, to discuss the application of surgical principles of the in-continuity type of resection. I have performed such procedures as radical neck dissection with segmental resection of the mandible, the pull-through procedure, the discontinuity type of resection, e.g., implantation of radium into lesions of the tongue, followed at a later date by neck dissection and finally by the combined operation. The last-mentioned procedure approaches more closely the ideal for removal of carcinoma and its potential, thereby giving the patient a better chance for survival. A few cases will be summarized to illustrate some of these problems.

CASE 1.—E. J., a white married woman aged 54, had a squamous cell carcinoma of the posterior portion of the right buccal area. On June 7, 1955, she was treated by interstitial irradiation; on December 14, a metastatic nodule was observed at the angle of the mandible, and radical neck dissection, with segmental resection of the mandible and the primary tumor area, was done on December 16. Microscopic examination showed invasion of the nerve sheaths and of the periosteum of the mandible. On May 22, 1956, nodules appeared in the operative area, and on August 15 the patient died of widespread local recurrence. (**Note:** *This is indicative of improper management.*)

My own results are most encouraging when I deal in a forthright and determined manner with the process; that is, when I have planned the therapeutic procedure so that the first application of therapy will be final and definitive and the process eradicated. It is known that radical surgical therapy has in some ways reached its limitations, but by taking advantage of current improvements and refinements one should be able to increase the survival rate. In his book *The Truth About Cancer*

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**Chairman of Department of Oncology and Professor of Oncology and Surgery, Medical College of Georgia, Augusta.

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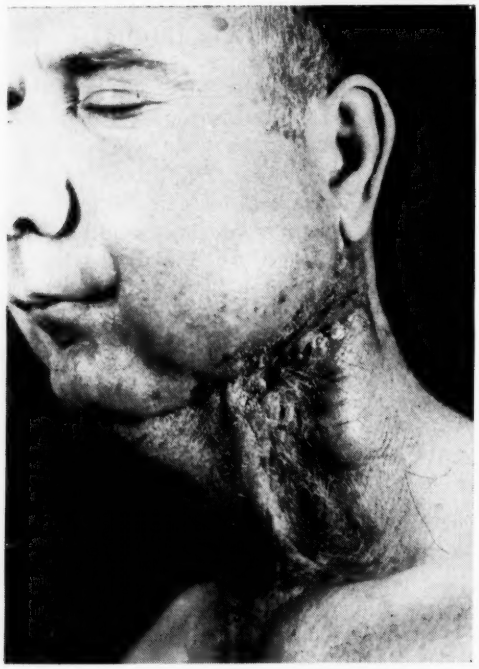

Fig. 1.—Patient in Case 1 (see text).

Cameron[1] stated: "Cancer of the mouth can be cured six or seven times out of ten when it is no larger than a man's thumbnail, yet among all cases of cancer in this area, less than ⅓ are cured." He also stated: "Cancer is about twice as curable as the present overall cure rates indicate."

Survival Rate.—One reviewing the literature undoubtedly has mixed reactions to the various methods of treatment employed and the end results. Estimates of a five-year overall survival rate are reported by different clinics and areas at approximately 35 per cent. This means that only 1 out of 3 patients with primary intraoral carcinoma survives for five years free of disease, either recurrent or metastatic. The other 2 are lost to the disease. This is frightening when one considers the advances in surgery, the improved understanding of physiologic functions, and of preoperative and postoperative care, the advances in anesthesia and, finally, the mass education of the public as to the dangers of carcinoma.

Surgical Principles.—The principles of radical surgical intervention were set down long ago. Knowledge of surgical dissection as required for carcinoma in a specific site was first contributed by LeDran[2] (1685-1770). It was he who adhered to the principle that carcinoma is a local manifestation in its early stages but spreads by way of the lymphatics to regional lymph nodes and to the circulatory supply of various organs. Further contributions were made by such anatomists as Cuneo and Rouviere,[3] who demonstrated the course of lymphatic drainage from various organs. This was a highly important contribution, as they explored the lymphatic roots in detail; as a result of their study, better, more extensive plans could be made for ridding the patient of carcinoma by developing the so-called *en bloc* dissection of the primary tumor together with its regional lymphatics. Surgeons accept this principle as the foundation of modern surgical treatment of carcinoma. Undoubtedly, if one did not have to deal with the metastatic spread of carcinoma, the chances of curing the patient of this disease would be much better.

The performance of operations of this type should be most meticulous, in order to avoid technical errors and prevent soiling of the wound by malignant cells. The spread of tumor by surgical manipulation has been reported by Ackerman[4] and Smith.[5] The latter reported positive identification of tumor cells in 28 per cent of the cases. Surgical intervention for lesions of the oral cavity must be definitive, encompassing the primary plus the intervening tissue and the secondary area of involvement. Furthermore, one must give due consideration to the physiologic com-

fort of the patient. The approach to operation in this area requires that one be well schooled in the knowledge of anatomic structures; this is extremely important if one attempts to rid the patient of carcinoma. Certain vital structures may be sacrificed in the hope that the patient will be rid of the disease, but the question may rightly be asked, "Did I rid the patient of his disease and clear all the area of the tumor, or did I just stimulate it to spread and grow?" In addition to having anatomic knowledge, one must respect the biologic potential of the tumor and the immunologic resources of the patient.

For the proper appreciation of surgical procedures, no discussion of any phase of malignant disease with regard to its therapeutic management can be undertaken without first making some reference to the biologic potential of the tumor and its method of spread. One must take into consideration the origin of the tumor, its focal nidus, its ability to invade adjacent tissues and spread to contiguous structures and its penetration of lymph channels and blood vessels, with wide dissemination of malignant cells. Willis[6] discussed extensively the spread of carcinoma via invasion of tissues, lymphatics and vascular channels. The disease is extended by infiltration of tissue spaces by malignant cells, by dissection of the tissues along the planes of anatomic cleavage and by occupying all available space. This extension into spaces determines more or less accurately the size and the shape of the tumor, as well as the degree of induration and the tumor's mobility. Tumor emboli gain entrance into the lymphatic system and spread to nodes. Tumor emboli may flourish or remain quiescent for a time or may die. Lymphatic vessels may become occluded, and, as a result, there will be a reversal of the flow of the lymph, resulting in retrograde extension of the tumor. Tumor emboli gain entrance into the vascular system chiefly through the veins, as they are more susceptible to invasion than are the arterial vessels. It is true that in some instances one can predict the directional spread of the process, but this may be ultimately dependent upon the point of origin of the tumor, the rapidity of its growth and the resistance of the patient. The fact that lymphatic pathways have been described (and one can usually predict the *direction* a tumor will assume in its spread) does not mean that we can afford to become complacent about this, because it may be altered from time to time. Thus, the clinical extent of the tumor cannot always be determined. This is all most important when one is assessing the operability of the lesion and performing the operation.

With regard to the lymphatic drainage of the intraoral region there are five main groups of lymphatics: (1) submaxillary; (2) parotid; (3) internal jugular; (4) spinal accessory chain, and (5) transverse cervical.

These groups have many subdivisions, such as, prevascular, retrovascular, preglandular and intraglandular. It makes no difference, of course, whether the lymphatic vessels are afferent or efferent, as the metastasis may be in the direction of the lymph flow or against it, and thus there may be retrograde lymph flow. By employing a surgical procedure of an in-continuity type the surgeon should be able to remove the potentially involved lymphatic area, provided he has determined beyond a reasonable doubt that the process can be completely extirpated.

Surgical Technic.—In order to accomplish this procedure, a unilateral neck dissection is performed according to the principles laid down by Crile;[7] refinements, however, have been added from time to time which now make it possible to perform a complete in-continuity resection for lesions of the tongue, buccal mu-

cosa, gingival margin and, occasionally, lesions of the lip with invasion of bone—that is, including the primary lesion plus the intervening tissues, the mandible and the lymph nodes secondarily involved. In other words, the procedure should be performed in such a manner as to remove the lymphatic potential. This has been aptly expressed by Pressman:[8] "It must be our aim to remove *in toto* the entire lymph drainage area containing the metastasis plus at least the lymphatic tissue next beyond it." He also refers to the "forgotten zone" and advises removal of all muscles attached to the hyoid bone. In addition to the clearing of this area, he sometimes performs a hemithyroidectomy. Such a procedure provides good anterolateral clearance. There is another area of great importance, however, and of the utmost consideration for meticulous technic, and this is the triangle between the mastoid and the angle of the mandible, for the lymphatics in this area are extremely complex. Here we encounter the parotid gland and its relationship to the surrounding structures. In order to clear this area it is very necessary that the insertion of the sternocleidomastoid muscle be sharply dissected and a thorough dissection of the subgastric area be done with sacrifice of the posterior belly of the digastricus and the stylohyoid muscle. It is in this area that recurrences are likely, as is illustrated by Case 2.

CASE 2.—J. G., a white man aged 46, had a lesion measuring 11 by 15 cm. on the left side of the floor of the mouth, which proved to be a squamous cell carcinoma. It was treated by radical neck dissection, and hemimandibulectomy, with hemiglossectomy of the floor

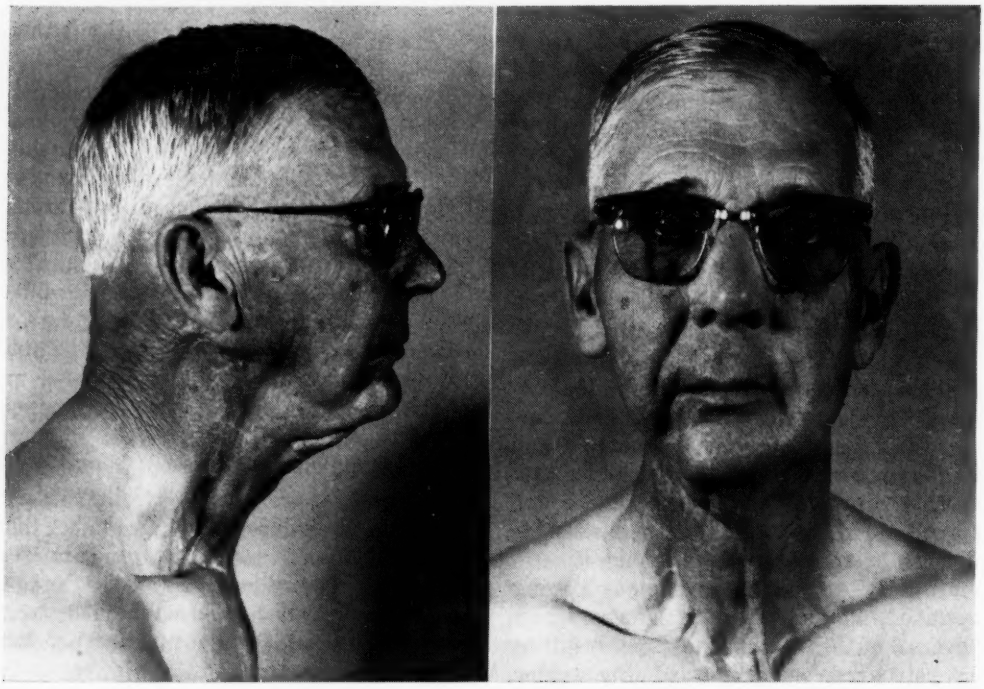

Fig. 2.—Patient in Case 2 (see text).

of the mouth. There were no metastatic nodes. The patient died ten months later of an external metastasis in the operative field, occurring just posteriorly along the trapezius and the mastoid area and, later, the rest of the operative field.

The neck having been dissected and cleared of lymphatics, the field is prepared for the resection of the mandible. Contributions on this procedure have been made by a number of authors: Ward and Hendricks[9] (the pull-through technic); later, Slaughter,[10] Roux, Billroth and Kremen[11] (dissection of the jaw) and, finally, hemimandibulectomy (Martin[12]). The last-mentioned operation is performed by making a midline incision in the skin in the midportion of the mandible, dividing the mandible for mobility and then obtaining an adequate line of margin on the tumor, whether it be on the gingival margin, the floor of the mouth, the tongue or the buccal area. The mandible is removed by disarticulation at the temporomandibular joints. I prefer the hemimandibulectomy to any form of mandibular or segmental resection and prefer not to use any type of bone graft since the cosmetic result and physiologic function are excellent, as is shown in Case 3:

CASE 3.—E. A. J., a white man aged 52, had a squamous cell carcinoma measuring 3.2 by 1.5 cm. in the lower right gingival area. He was treated by combined radical neck dissection and resection of the jaw and of the primary tumor. No metastatic nodes could be detected. At the time of writing, the patient's general condition is excellent.

The postoperative shifting in the mandible may be controlled by the proper application of dental splints or by wiring the teeth that are present. A tracheostomy is always performed, and a gastrostomy is advisible if there is any question of nutritional difficulties. I also use negative pressure under skin flaps, as described by Raffl.[13]

COMMENT

Why should one consider performing such a radical procedure for apparently small and localized lesions? To reiterate, the survival rate for localized lesions surgically treated is 70 per cent; for those treated by radiation it is 40 per cent, and for all cases it is 13 per cent, according to the Connecticut State Health Department.[14] Nonetheless, it should be pointed out that there are patients on whom extensive procedures are performed for apparently localized small lesions. This is done because of difficulty in assessing the true extent of the lesion. Further indications for performing an in-continuity procedure are provided by the statistics of Copeland[15] and others on patients with "positive" lymph nodes. They are as follows: lip, 4 to 30 per cent; tongue, 35 to 60 per cent; gingival margin, 25 to 65 per cent; buccal mucosa, 30 to 50 per cent, and floor of mouth, 25 per cent.

Another point for consideration is invasion of the mandible, as pointed out by Byers,[16] occurring through the middle foramen, particularly in an elderly, edentulous patient in whom bone absorption causes the position of the middle foramen to become superficial and vulnerable to invasion. Further, in the passage of the lymphatics through the mandible, as was demonstrated by Polya and Navatril,[17] in 50 per cent of the patients blood vessels in the tongue and the floor of the mouth pass through the periosteum of the mandible on their way to the cervical lymph nodes.

Fremont Smith[18] concluded that the survival of the patient depends on the eradication of tumor from the largest amount of tissue with the least possible delay. Thus, survival is determined by two factors:

1. The distribution of the tumor cells at the time of treatment.

2. The amount of tissue cleared of

tumor by the method of treatment employed.

Of course, it is not always possible to apply this procedure, because of the varying operability of the lesion and the general condition of the patient. Operability is dependent upon the edema and fixation of the related structures; as far as treatment of the tongue is concerned, there are those who advocate control of the primary tumor by treatment with interstitial irradiation, followed later by a radical neck dissection, as advocated by Cade,[19] which may be unilateral or bilateral, and preferably is performed in stages. Surgical dissection of the cervical lymph nodes is always preferable to radiation therapy.

In the performance of long and tedious operative procedures of this sort, one must take into consideration one's own physical stamina and the accuracy of one's technic at the end of a procedure lasting several hours. It seems advisable, therefore, that teams be employed to carry out the procedure whenever possible. The unfortunate part about it is that the simplest and the easiest part of the operative procedure, the primary neck dissection, is performed while the operating surgeon is at his maximum level of physical condition; but as the procedure continues and he nears the end of the operation, when he is attempting to get an adequate margin beyond the tumor-bearing area, he has become fatigued and therefore is unable to utilize his technical skill to the best advantage of the patient.

CONCLUSIONS

Great advances and improvements have been made in the application of surgical principles by those interested in the control of malignant disease, but the overall results throughout the United States are not as good as they should be. It is hoped that when the factors encountered are recognized the survival rate will be greatly increased. In the author's opinion, one should give serious consideration to the program of an in-continuity type of operation for these lesions of the oral cavity in order to save the greatest possible number of patients with what may be considered early lesions.

It would not, of course, be possible to resect the tumors in all cases, because of inoperability. Prophylactic neck dissection should be performed for lesions of the gingival margin, the buccal mucosa, the floor of the mouth and the tongue. Because of the apparently slow metastasis of lesions of the lip, prophylactic neck dissection may be deferred. Occasionally bilateral neck dissection is indicated, but the author prefers to do this in stages after resection has been done on the side involved.

CONCLUSIONS

De grands progrès ont été réalisés dans le traitement chirurgical des tumeurs malignes de la cavité buccale, mais aux Etats-Unis les résultats globaux ne sont pas encore ce qu'ils devraient être. Le taux de survie serait plus élevé si ces affections étaient reconnues à temps. Il faudrait prendre en considération un type d'opération en plusieurs temps, permettant de sauver le plus grand nombre de cas possibles au stade dit précoce des lésions.

Il est évident que toutes les lésions ne sont pas réséquables. Une dissection prophylactique devrait être entreprise pour les lésions du liséré gingival, de la muqueuse buccale, du plancher de la bouche et de la langue. Etant donné la leteur de l'apparition de métastases des lésions labiales, la dissection peut être retardée dans ces cas. Une dissection bilatérale peut être indiquées parfois, que l'auteur préfère pratiquer en plusieurs temps, après la résection du côté intéressé.

CONCLUSIONES

Aunque los avances en el tratamiento quirúrgico del cancer sean evidentes gracias al atrabajo de los integrados an la cancerología, sin embargo los resultados observados en los Estados Unidos no son tan alagüeños como podía esperarse.

Se confía en que cuando puedan estudiarse y conocerse ciertos aspectos de la cuestión, la supervivencia será mucho más alta.

Según opinión del autor, debiera estudiarse de un modo particular la posibilidad de realizar operaciones en *varios tiempos* para tratar las lesiones cancerosas precoces en la cavidad bucal, para que de esta manera se salve el mayor número posible de enfermos.

Desde luego no todos los tumores pueden extirparse, pues algunos son inoperables.

Hay que hacer una limpieza de los ganglios cervicales cuando el cancer se asienta en las encías, lengua, suelo de la boca o la mucosa bucal.

En cambio esta disección no es necesaria cuando se trata de un cancer de labio, ya que las emtástasis son tardías. A veces la limpieza ganglionar debe ser bilateral, pero el autor prefiere hacerlo en varios tiempos después de limpiar el lado correspondiente a la lesión.

CONCLUSIONI

Nonostante i grandi progressi ottenuti nella cura delle lesioni maligne, i risultati complessivi che si ottengono al giorno d'oggi negli Stati Uniti non sono ancora così buoni come dovrebbero. Si deve sperare che con l'aumentare delle conoscenze si potrà prolungare la media delle sopravvivenze. L'autore pensa che si debbano fare dei programmi operatori complessi per la cura dei tumori del cavo orale, allo scopo di salvare il maggior numero di pazienti possibile. Non sarà sempre possibile, naturalmente, la cura radicale; la dissezione del collo profilattica dovrà essere attuata nelle lesioni dei bordi gengivali, della mucosa buccale, del pavimento della bocca e della lingua; sarà differita nei tumori del labbro, che metastatizzano lentamente. Talvolta sarà necessaria la dissezione bilaterale, ma sarà bene farla in due tempi, dopo l'asportazione del tumore.

SCHLUSSFOLGERUNG

Die Durchführung chirurgischer Grundsätze hat in der Kontrollierung bösartiger Erkrankungen zu grossen Fortschritten und Verbesserungen geführt. Trotzdem sind die Gesamtergebnisse innerhalb des Gesamtgebietes der Vereinigten Staaten noch nicht so gut wie sie sein sollten. Man hofft, dass mit der Erkennung der Faktoren, die hier eine Rolle spielen, sich die Überlebensquote erheblich erhöhen lässt. Der Verfasser glaubt, dass der Entwicklung einer Art von Kontinuitätsoperation dieser Erkrankungen ernste Beachtung geschenkt werden sollte, um eine möglichst grosse Anzahl von Patienten mit Erkrankungen, die als Frühstadium angesehen werden, zu retten.

REFERENCES

1. Cameron, C. S.: The Truth About Cancer, Prentice-Hall, Inc., 1956.

2. LeDran, H. F.: Am. Surgeon 23:344, April 1957.

3. Rouviere, H.: Anatomy of the Human Lymphatic System. M. J. Tobias, Edwards Bros., Inc., 1938.

4. Ackerman: Implantation of Cancer—An Avoidable Surgical Risk, Surgery 37:341 (March) 1955.

5. Smith, and Helger: Cancer Cell Seeding of Operative Wound, N.C.I. 6: (Dec.) 1955.

6. Willis: The Spread of Tumors in the Human Body, St. Louis: The C. V. Mosby Company, 1952.

7. Crile, G. W.: Excision, Cancer of the Head and Neck, J.A.M.A. 47:1786, 1906.

8. Pressman, J. H.: Extended Retrohyoid Radical Neck Dissection for Cancer of the Oral Cavity, Surg., Gynec. & Obst. 100:329 (March) 1955.

9. Ward, and Hendrick: Tumors of Head and Neck. Baltimore: The Williams & Wilkins Company, 1948.

10. Slaughter, D. P., and Southwick, H. W.: En Bloc Resection of Cancer of the Mouth and Surgery of Lymphatics with Preservation of the Mandible, Ann. Surg. 136:16, 1952.

11. Roux; Bilroth; Kremen, and Arnold, J.: Cancer of the Tongue—A Surgical Technique for a Primary Combined En Bloc Resection of Tongue, Floor of Mouth, and Cervical Lymphatics, Surgery 30:227, 1951.

12. Martin, H.; Del Valle, B.; Ehrlich, H., and Cahan, W. G.: Neck Dissection, Cancer 4:441, 1951.

13. Raffl, A. B.: Use of Negative Pressure under Skin Flaps after Radical Mastectomy, Ann. Surg. 136:1048, 1952.

14. Connecticut State Health Department, Cancer in Connecticut, 1935-1951, Griswold, Wilder, Cutler, Pollack, 1955.

15. Copeland, M.: An Evaluation of Neck Dissection for Cancer, Ann. Surg. 141:910, 1955.

16. Byars, L. T.: Extent of Mandible Resection Required for Treatment of Oral Cancer, Arch. Surg. 70:914-922, 1955.

17. Polya, and Navratil: Deutsche Ztschr. f. Chir. 66:122-125, 1902.

18. Smith, Fremont, see no. 5.

19. Cade, S., and Lee, E. S.: Cancer of the Tongue—A study based on 653 cases; Westminster Hospital, London, Brit. J. Surg. 44:187, 1957.

Much has been written and said, by nonmedical people, about physicians and the practice of medicine. Some of it is laudatory, much very critical. Neither the praise nor the criticism has full validity, since both are usually tinged by personal bias and often based on emotional reactions.

—*Farmer*

The physician may never take away all hope. An artillery officer shot himself on the staircase of Selle's house after he had insisted that the latter tell him the truth about his tuberculosis.

—*Stieglitz*

Vaccination will go on just as well when I am dead as it does during my existence, probably better, for one obstacle will die with me—Envy.

—*Jenner*

The patient is the center of the medical universe, around which all our works revolve and towards which all our efforts tend.

—*Murphy*

The primitive woman whose baby was presented in an abnormal position, transversely or feet first, usually died, and her child with her, or the child alone was removed by a mutilating operation. In the sixteenth century the famous surgeon Ambroise Paré re-introduced podalic version, a method of turning the child in the uterus before birth. And in the same century and the following, successive members of the Chamberlen family were famed for a secret method which they used in delivering difficult births. Divulged after two centuries by a member of the family, the secret consisted of a pair of forceps, which soon became a popular instrument with "man-midwives."

—*Slaughter*

Complications of Middle Third Facial Fractures

FREDERICK J. McCOY, M.D., F.A.C.S., F.I.C.S.

KANSAS CITY, MO.

FRACTURES of the maxillae with the associated nasal and zygomatic bones are commonly referred to as fractures of the middle third of the face. This portion of the facial skeleton attaches to the cranium at the zygomaticofrontal, the frontonasal and the frontomaxillary sutures. It is bounded below by the occlusal plane of the teeth (Fig. 1).

Read at the Twenty-Second Annual Congress of the United States and Canadian Sections, International College of Surgeons, Chicago, Sept. 8-12, 1957.

Figures 4, 6, 9, 10, 11 have appeared wholly or in part in article by author referred to in reference 2.

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Fractures in this area are commonplace. The energy of the force producing the trauma and the shifting of bone fragments often cause injury to the important soft tissue structures of the cranium and orbit that may not be easily resolved. Further injury to these structures may be inadvertently incurred in the course of treatment unless such a possibility is fully realized.

In a very real sense, failure to recognize and treat facial fractures is a complication

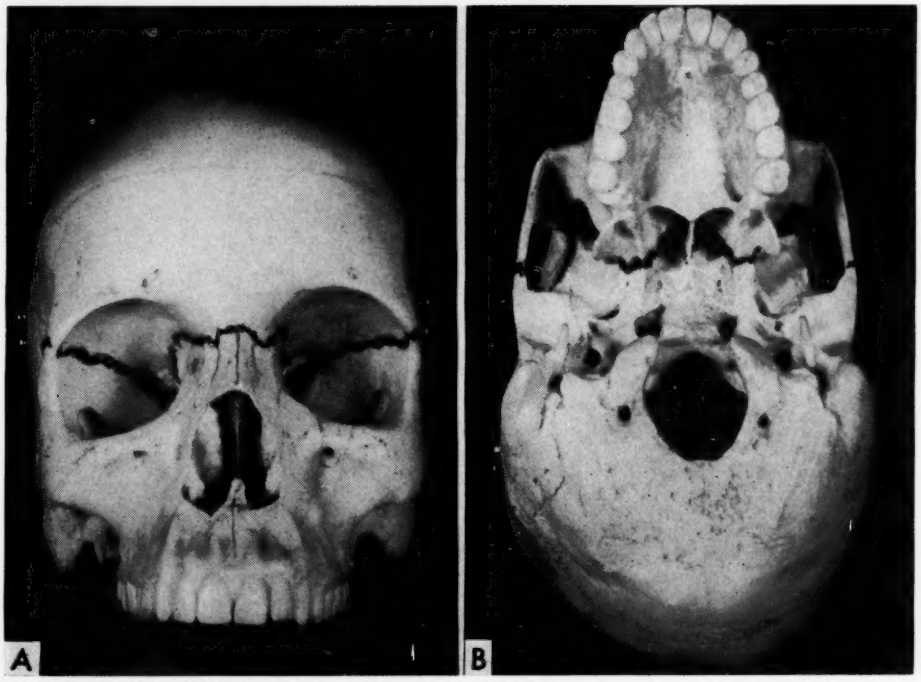

Fig. 1.—*A*, "middle third" of face is delineated above by frontonasal and frontomaxillary sutures centrally and zygomaticofrontal sutures laterally. Inferiorly it extends to occlusal plane of upper teeth. *B*, posteriorly it extends to junction of palatine bones with pterygoid processes of sphenoid.

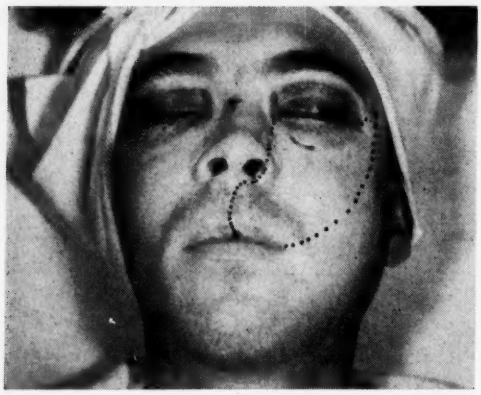

Fig. 2.—Patient with fracture of left maxilla, demonstrating three common signs of facial fractures, viz., orbital ecchymosis, anesthesia of cheek, lower eyelid, nose, upper lip and gingiva on the affected side (infraorbital nerve distribution), palpable irregularity in central third of infraorbital margin.

frequently encountered. Swelling masks deformity immediately after trauma, and other more obvious injuries may command attention, with the result that proper treatment is not carried out. In the case of cerebral concussion, inactivity is substituted many times for accurate evaluation, and valuable time is lost. Reduction of facial fractures is best carried out within the first four to seven days. On the other hand, there is little to support the mythical and oft-repeated "two weeks" limitation. Experience has shown repeatedly that successful open reduction can be accomplished, even up to six or eight weeks.

In the case of any patient presenting evidence of trauma to the head one should suspect the possibility of facial fractures. Three common clinical signs are: (1) orbital ecchymosis, (2) anesthesia in the infraorbital nerve distribution and (3) palpable irregularity of the infraorbital rim (Fig. 2).

Radiography is indispensable, but to be helpful it must be of better than average quality. The commonly done posterior-anterior and lateral views are of limited value. The Waters projection, preferably taken stereoscopically, is much more informative. Planograms are sometimes advisable for visualizing paper-thin bone structure of the orbital floor.

Cranial Complications. — Among the more serious complications are those involving the cranium and the cranial nerves. *Cerebrospinal rhinorrhea* frequently results from a dural tear in the cribriform area. Its significance lies in the fact that communication exists between the nasal and cranial cavities, and concentrated antibiotic therapy is indicated. Spontaneous closure within three to six days is the rule, though occasionally surgical repair is necessary.

Any one of the first seven *cranial nerves*

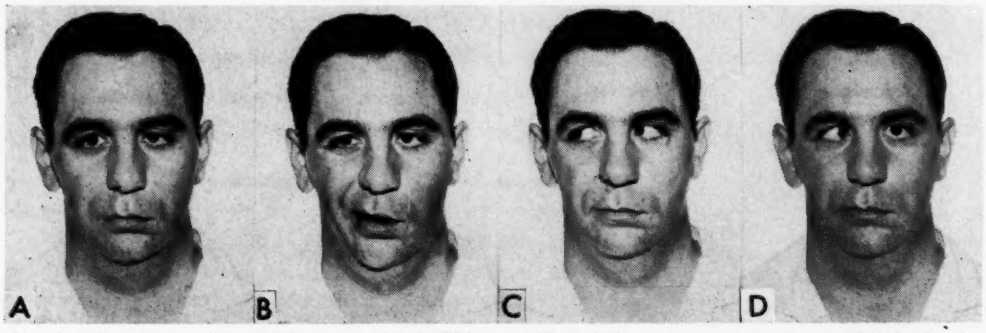

Fig. 3.—Fractures of facial bones and mandible complicated by severe concussion and injuries to cranial nerves I, IV, V, VI and VII. *A*, after 1 year, face in repose. *B*, smiling, slight motion on left, weak on right. *C*, looking to right. *D*, looking to left.

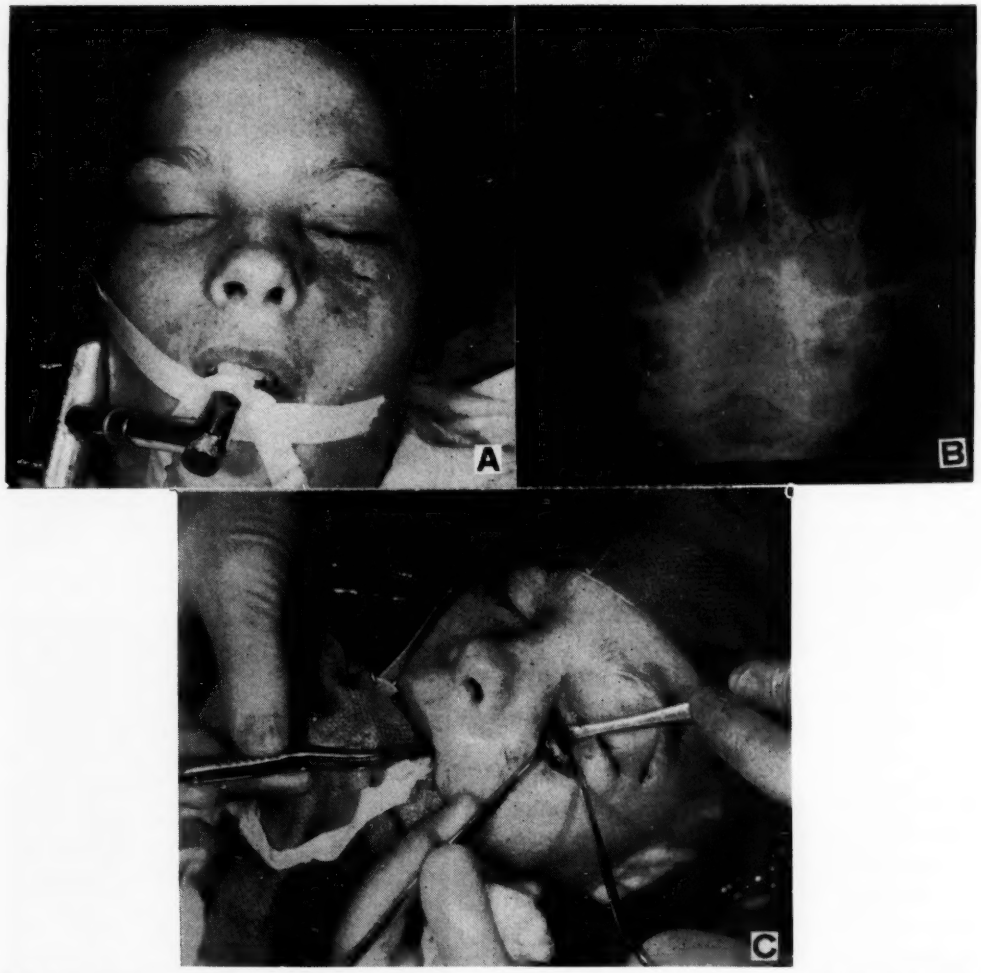

Fig. 4.—*A*, depressed fracture of left maxilla. Photograph with patient anesthetized demonstrates flattening of the malar prominence and enophthalmus but does not show the marked downward displacement of the globe. *B*, roentgenogram with principal malar fragment outlined. Just above infraorbital rim separation is large obliquely tilted fragment from comminuted orbital floor. Antrum cloudy, owing to hemorrhage. *C*, open reduction; rim separation closed and wired (No. 28 s.s.), fragments of orbital floor replaced and antral packing inserted under direct vision. (Malar reduction has also been carried out by Gillies method and zygomaticofrontal separation has been wired through incision beneath brow.)

may be injured, in which case there is usually, but not invariably, attendant cerebral concussion. At the moment of impact there is undoubtedly a rather marked distortion of the brain mass, stretching and tearing the cranial nerves. The third, fourth, fifth, sixth and seventh nerves, when involved, are usually injured in this manner. Fortunately function is usually recovered (Fig. 3).

At other times shifting bone fragments may shear off an important nerve trunk where it passes through its bony foramen. When this involves the first nerve and the

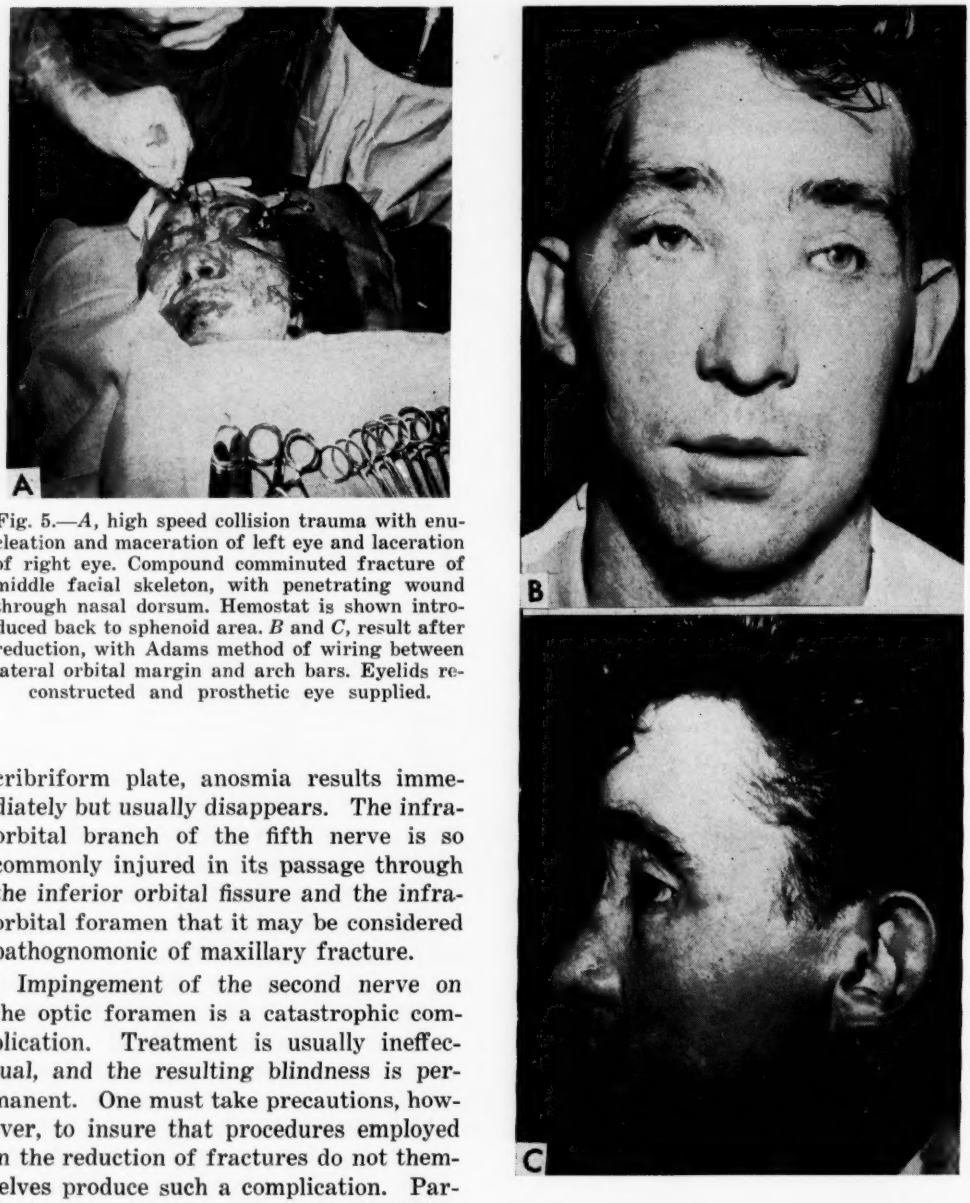

Fig. 5.—*A*, high speed collision trauma with enucleation and maceration of left eye and laceration of right eye. Compound comminuted fracture of middle facial skeleton, with penetrating wound through nasal dorsum. Hemostat is shown introduced back to sphenoid area. *B* and *C*, result after reduction, with Adams method of wiring between lateral orbital margin and arch bars. Eyelids reconstructed and prosthetic eye supplied.

cribriform plate, anosmia results immediately but usually disappears. The infraorbital branch of the fifth nerve is so commonly injured in its passage through the inferior orbital fissure and the infraorbital foramen that it may be considered pathognomonic of maxillary fracture.

Impingement of the second nerve on the optic foramen is a catastrophic complication. Treatment is usually ineffectual, and the resulting blindness is permanent. One must take precautions, however, to insure that procedures employed in the reduction of fractures do not themselves produce such a complication. Particular care must be exercised in inserting antral packs, for example, to avoid manipulations in the posterior recess of the cavity. There is an ever-present danger that a sharp bone spicule may be forced into the optic nerve. This can be avoided by exploring the orbital floor and packing under direct vision (Fig. 4).

Rarely, delayed and unavoidable complications may occur when chronic arach-

noiditis produces constricting adhesions or retrobulbar neuritis leading to optic atrophy. Other cases, in which there is slowly progressive nerve impingement by bone callus at the fractured foramen, have been reported.

Orbital Complications.—The eyeball is surprisingly resistant to trauma, owing to its ingeniously cushioned support. The orbital rim margins are composed of dense bone and, unless they are collapsed completely, offer effective protection from forcible contact with relatively broad surfaces (Fig. 5).

Globe displacement often accompanies fractures of the middle third. Immediately after fracture-dislocation of the orbital floor the eyeball will be shifted downward and backward. Within a few minutes intraorbital edema and hemorrhage lend transitory support, masking the underlying problem. *Proptosis* is less common and may endanger the cornea by exposure. It may be due to retrobulbar hemorrhage, edema or emphysema if there is communication with the sinuses. Later, retrobulbar granuloma or mucocele may be causative factors. Late globular displacement is much more commonly downward and backward. It is usually produced by an unresolved comminution of the orbital floor, so that there is a loss of support as well as scar contracture into the antrum (Fig. 6).

It should be reemphasized that extensive damage to the orbital floor may be present *with no clinical or radiographic evidence of displacement of the infraorbital rim* (Figs. 6 and 7). The denser orbital ring may spring back, after the displacing force is spent, to approximately normal position. The stacked or telescoped thin fragments of the orbital floor, however, remain behind. This leaves a communication between the soft tissues of the orbit and the antrum.

Extraocular muscle imbalance may result from injury to the third, fourth or

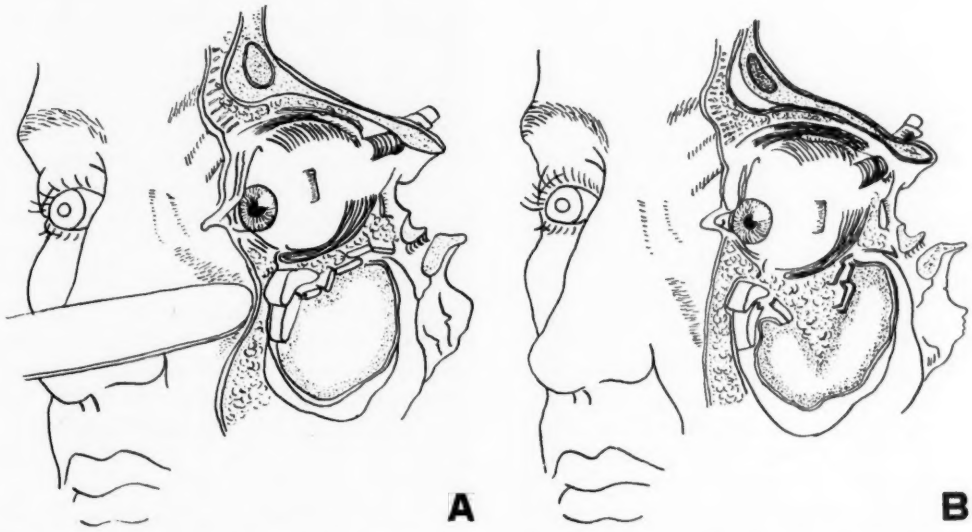

Fig. 6.—*A*, diagrammatic illustration of frontal force displacing inferior orbital margin posteriorly with comminution and telescoping of fragments of orbital floor. *B*, after cessation of force, heavier bone springs partially back toward normal position, leaving thinner bone fragments behind; herniation of orbital contents into antrum; downward and backward displacement of globe. (*Redrawn after Rowe and Killey.*[3])

sixth cranial nerve or by direct injury to the muscle or its attachments. Scar adhesions may limit motion, producing a "check rein" effect (Fig. 7).

Ptosis may occur when there is concommitant involvement of the levator muscle or its nerve supply. It may also be caused by an especially severe degree of enophthalmus, as is demonstrated by the patient shown in Figure 8. Both orbits are greatly elongated vertically, increasing the orbital volume.

The elongation is demonstrated in the lateral view. Here, after six months, there is nonunion of the entire middle third of the face. Note in the upper right photograph that pressure on the central incisors moves the whole pyramid upward at least 1 cm. The limited opening of the jaws is produced by impingement of the mandibular coronoid processes beneath the zygomatic arches.

This patient also exhibits other complications, including total loss of vision in the right eye, injuries to the first, second, third, fourth, fifth and sixth nerves, epiphora and chronic obstructive dachryocystitis.

Epiphora is sometimes produced by extensive damage to the intraosseous portion of the lacrymal apparatus. If the fracture displacement is satisfactorily corrected, function is usually recovered. If not, epiphora and recurrent, obstructive dachryocystitis will necessitate further surgical attention. Lacerations of the canaliculae can and should be promptly repaired.

Nasal Complications. — Frontal force applied at the central point of the face produces flattening and spreading of the naso-ethmoid compound. At times there is encroachment into the medial aspect of the orbits, increasing the intraocular distance by lateral displacement of the globes. While this is actually a part of the fracture problem itself, it is here considered as a complication, because of the unusual difficulties encountered in its proper reduction. Here, even more than elsewhere, early treatment is desirable. Forcible manipulation of the naso-ethmoid arch with Asche forceps, applied through small angular incisions medial to the inner canthus, is effective.[2] The arch is then maintained by a rectangular wire loop inserted through drill holes and tied beneath the skin. This method has proved superior to the wire-over-lead-plate method in that it allows a more judicious placement of the fixation, eliminates the danger of pressure necrosis of the skin and the wire can be left in place indefinitely (Fig. 9). When treatment has been delayed, or when comminution and impaction have been especially severe, elastic traction may be indicated. To be effective, forward traction must be accompanied by traction on each side of the arch toward the midsagittal plane.

This can be accomplished by means of a figure-of-eight wire loop inserted as shown and attached by rubber bands to a plaster head cap outrigger[2] (Figs. 10 and 11).

When the entire central pyramid is retrodisplaced and treatment has been delayed, traction again is useful. Note that, in the patient shown in Figure 12, the wires are brought out at the alar creases to place any scarring in an inconspicuous area.

Oral Complications. — Malocclusion is the principal oral complication. Properly applied intermaxillary fixation is frequently necessary. Moderate amounts of displacement are readily corrected by elastic traction between arch bars for a few days, but at times the upward and backward maxillary dislocation is so severe that manual disimpaction is required. A severe open bite deformity, if unresolved early, may well require rather heroic surgical measures for later correction.

Fig. 7.—*A*, patient with enophthalmus and downward globe displacement developing three months after injury. Note absence of other indications of fracture-dislocation. *B*, patient looking upward, left eye "check-reined" at just above level position by scar adhesions and orbital floor fractures. *C*, left profile to show sunken appearance of eye. *D*, right (normal) side for comparison.

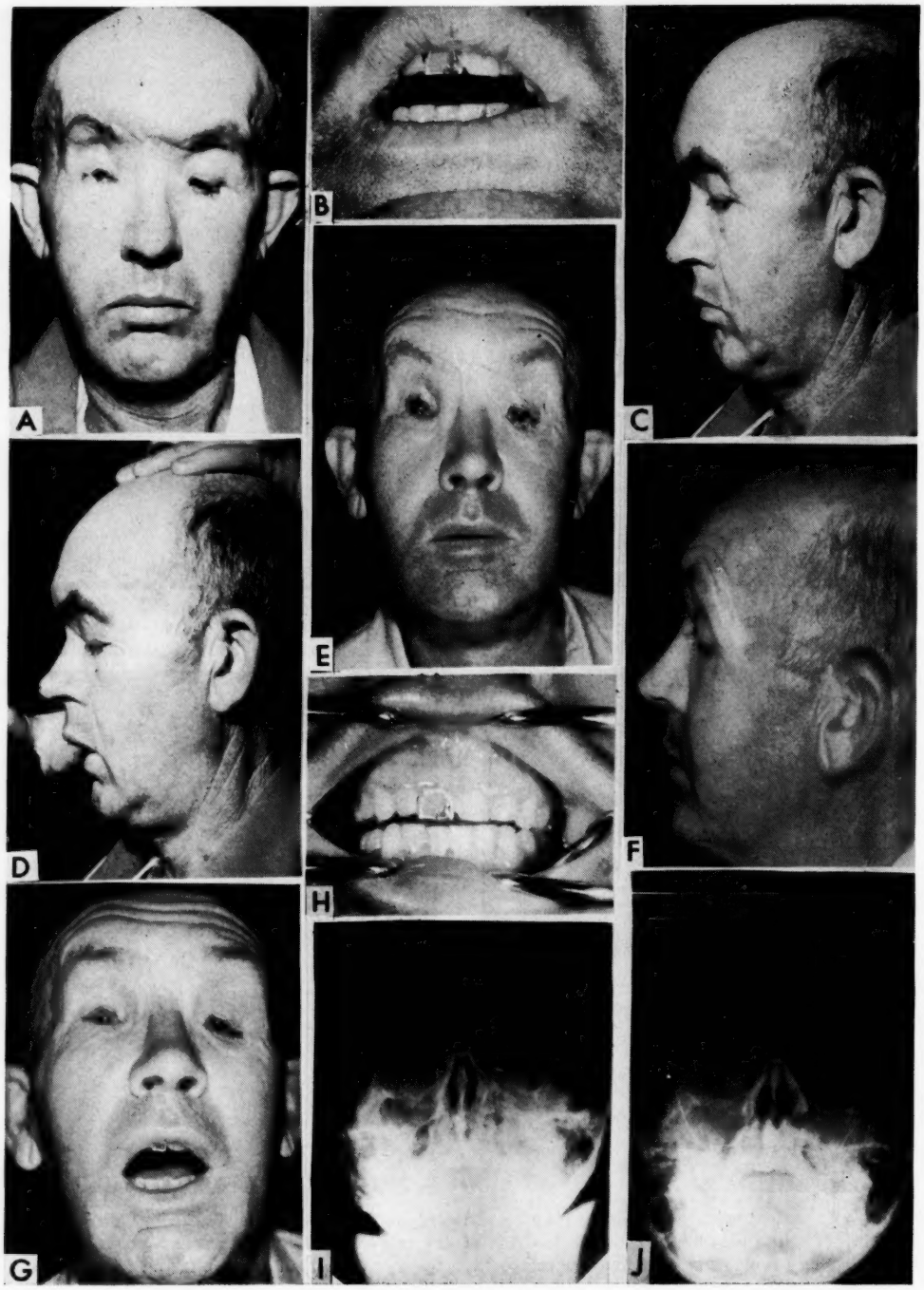
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Fig. 8 (*opposite*).—*A*, six months after concussion with extensive middle facial fracture by falling tree. Blindness of right eye due to nerve injury of seventh nerve. Bilateral ptosis due to orbital displacement. Complete nonunion of middle third of face. *B*, marked limitation of mandibular excursion due to impingement of coronoid processes beneath zygomatic arches and downward dislocation of middle third. *C* and *D*, compare lateral views. In *D*, upward pressure on upper jaw has shortened mid facial dimension by 1.5 cm. *E* and *F*, after suspensory wiring of facial bones. Enophthalmus improved by reducing volume of bony orbits. Face shortened to near normal. *G* and *H*, mandibular excursion and occlusion considerably improved. Maxilla tilted, owing to loss of bone, right maxilla. *I*, view showing loss of bone at right zygomaticofrontal anchorage, separation on left. Wires previously inserted have broken. Extensive comminution. *J*, suspensory wiring from frontal bone on left through anterior nasal spine to frontal bone on right.

Trismus may result from impingement of the mandibular coronoid process against a depressed malar arch (Fig. 8).

Nonunion.—Nonunion is not a frequent complication of facial fractures. When it occurs it is usually the result of osteomyelitis or loss of bone due either to the injury itself or to overzealous débridement. No bone fragment should be removed from the face if it can be covered completely with viable soft tissues. This is true regardless of whether it is attached or completely free. Rarely will it be lost or absorbed. When the nonunion involves the entire middle third pyramid the face is alternately elongated and compressed as the unfortunate patient attempts to chew (Fig. 8). Extensive bone grafting and wiring may be necessary to correct this distressing condition.

SUMMARY

Many of the complications — orbital, cranial, oral, etc. — encountered in the treatment of fractures of the middle third of the face are unavoidable, since they are produced at the time of injury and are a part of the initial clinical picture. Other complications may be produced by injudicious manipulations or by needless procrastination in initiating treatment. Owing to difficulties in their demonstration, it is perhaps excusable to fail to recognize such conditions as fractures of the orbital floor, but it is no less unfortunate for the patient.

Suggestions are made for both recognition and treatment of some of these fractures. Technical and clinical drawings and photographs are presented.

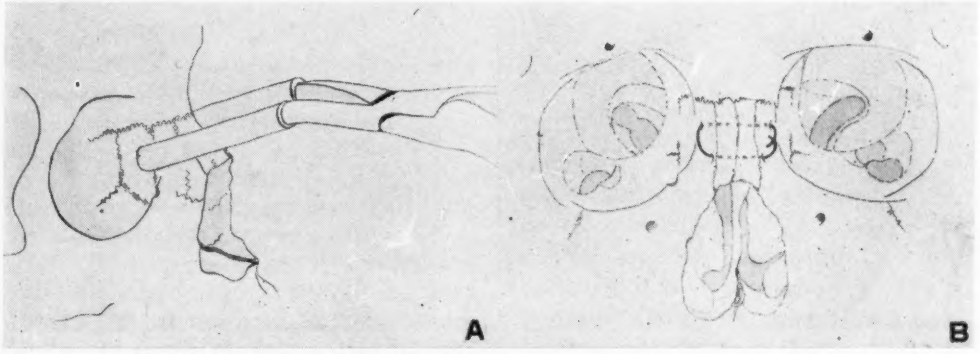

Fig. 9.—*A*, reduction of comminuted, widened nasoethmoid arch with Asche forceps introduced through incisions at inner canthi. *B*, stabilization by through-and-through wire ligature.

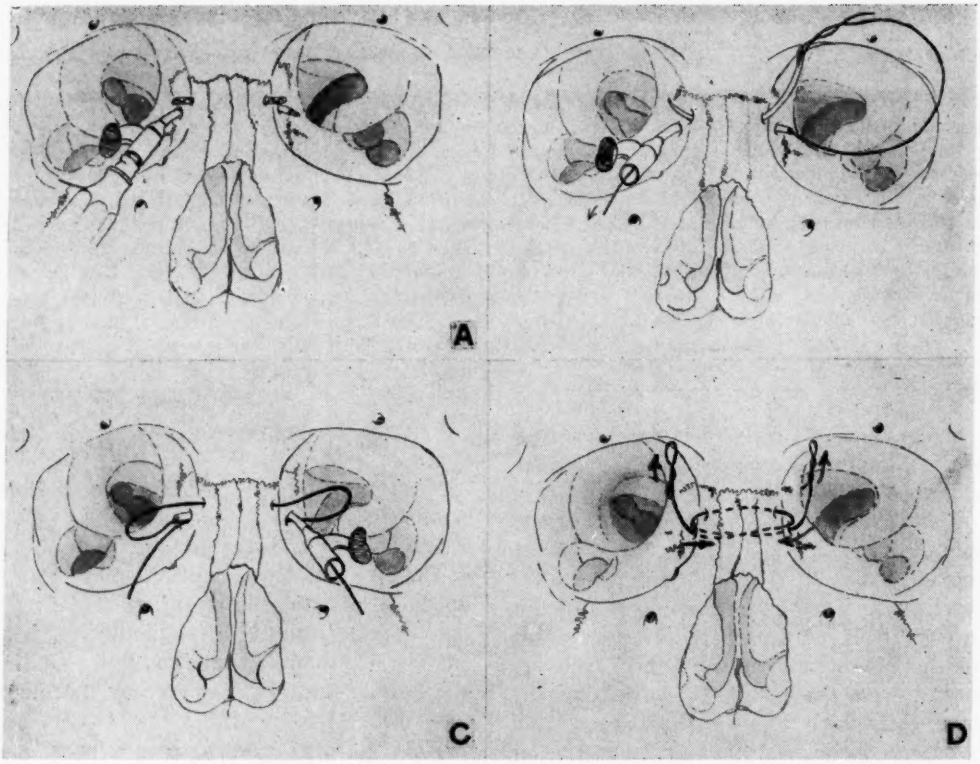

Fig. 10.—*A*, drill holes in dense bone of frontal process of maxilla just anterior to lacrymal fossa. Antrum trochar used to perforate fragile bone 1 cm. posteriorly. *B*, large curved needle threaded through drill holes with No. 28 s.s. wire. Trochar withdrawn and free end of wire threaded through cannula. *C*, trochar reinserted from right side and wire end pulled through, cannula withdrawn. *D*, figure-of-eight wire completed and ready for application of forward traction which will also force fragments toward midline.

Fig. 11.—*A*, widening and flattening with retrodisplacement of nasoethmoid arch being treated with figure-of-eight traction wire for four weeks. (Treatment was delayed for three weeks owing to intracranial complications.) *B*, condition after seven and one-half months.

Fig. 12.—*A*, five days after automobile injury. Multiple fractures of skull, facial bones and mandible. Patient still disoriented. Emergency tracheotomy still in place. Hastily repaired contused lacerations healing. *B*, traction wires, anchored at borders of pyriform fossa to reduce recession of central facial pyramid. Wires exist where scars will not show. *C* and *D*, after reduction, which involved intermaxillary fixation, Adams wire suspension, antral packing, bone graft to nasal dorsum. *E*, multiple comminuted fractures of face. *F*, posterior recession of central pyramid. Palate is free and "floating." Lavage tube for aspiration of large quantities of old blood. *G*, view showing collapse of frontal sinus area. *H*, position of suspensory wires attached to lower arch bar so that mandible splints upper jaw in occlusion. This is prior to reduction of nasoethmoid arch and insertion of forward traction wires shown in *B*.

RÉSUMÉ

Bien des complications rencontrées dans le traitement des fractures du tiers médian de la face sont évitables, car elles se produisent au moment de la lésion et bénéficient d'un traitement clinique initial. Certaines complications sont provoquées par des manipulations imprudentes ou par le retard du traitement initial. Une autre cause de complications est la difficulté de certains diagnostics (fractures du planer de l'orbite par exemple). L'auteur présente des suggestions utiles pour le diagnostíc ét le traitemente de quelques cas difficiles.

RIASSUNTO

Molte delle complicazioni che sopravvengono nella cura delle fratture della faccia sono inevitabili poiche esse sono già in atto al momento della lesione e fanno parte del suo quadro clinico. Altre ne compaiono in seguito per errori di tecnica o per aver ritardato nell'iniziare il trattamento. Se poi può essere scusabile il man-

Fig. 13.—*A* and *B*, depressed fracture right zygomatic compound with extensive comminution of orbital floor. Downward and backward dislocation of globe. Loss of bone right supraorbital area. Right unilateral spreading of nasoethmoid arch into right orbit. *C* and *D*, after reconstruction by reduction and fixation of nasoethmoid arch as shown in Fig. 8*B*, and iliac bone grafting to orbital floor and supraorbital defect. *E* and *F*, roentgenograms showing fracture dislocation of right malar compound (twelve weeks after injury), and supraorbital bone deficit.

cato riconoscimento di alcune di esse per la loro difficoltà, (per esempio la frattura del pavimento dell'orbita) ciò rappresenta ugualmente un serio danno per il malato.

Vengono forniti alcuni consigli per evitare simili inconvenienti e per risolvere alcuni di questi problemi.

RESUMEN

Muchas de las complicaciones que se presentan en el tratamiento de las fracturas del tercio medio de la cara son inevitables ya que han sido producidas al tiempo del accidente tomando parte ya en el cuadro clínico inicial. Otras complicaciones pueden haber sido producidas por manipulaciones inadecuadas o por retraso indebido para iniciar el tratamiento. Debido a lo difícil de su apreciación es acaso perdonable el no reconocer a tiempo algunas lesiones tales como la fractura del suelo de la órbita, pero es lamentable en

lo que se refiere al lesionado. Se sugieren ideas sobre el reconocimiento y tratamiento de estos problemas.

ZUSAMMENFASSUNG

Viele der bei der Behandlung von Knochenbrüchen im mittleren Drittel des Gesichtes auftretende Komplikationen lassen sich nicht vermeiden, weil sie zur Zeit der Verletzung entstehen und Teil des ursprünglichen klinischen Krankenbildes sind. Andere Komplicationen können jedoch durch unbesonnene Manipulationen oder durch unnötige Verzögerung der Behandlung hervorgerufen werden. Das Übersehen von Verletzungen wie Brüchen des Bodens der Augenhöhle lässt sich vielleicht mit der Schwierigkeit, dise Zustände nachzuweisen, entschuldigen, womit dem Patienten allerdings nicht geholfen ist. Es werden Vorschläge zur Erkennung und Behandlung einiger derartiger Probleme gemacht.

REFERENCES

1. Duke-Elder, S.: Textbook of Ophthalmology. St. Louis: The C. V. Mosby Co., 1954, vol. 6.
2. McCoy, F. J.: Management of the Orbit in Facial Fractures, Plast. & Reconstr. Surg. Vol. 19 (March) 1957.
3. Rowe, N. L., and Killey, H. C.: Fractures of the Facial Skeleton. Baltimore: The Williams and Wilkins Company, 1955.

Before the advent of Hippocrates and during his lifetime, medicine and philosophy were inseparably linked. The learned physician of ancient Greece was almost invariably a philosopher. Empedocles, Pythagoras, Democritos, Thales, Anaxagoras and Heraclites were all physicians as well as philosophers. They were, however, far more concerned with the spinning of philosophic theories than with the healing of the sick, so it is proper that posterity remembers them as philosophers rather than as physicians. Hippocrates, however, broke with this ancient tradition and wrote:

Some say, indeed physicians as well as sophists, that it is impossible to understand medicine, without knowing what man is, how he first appeared, and how he in the beginning became a being; this knowledge he must possess, who wishes to treat patients properly; but this view leads to philosophy, like the writings of Empedocles and of others who have written about nature. As for me, I believe that all these speeches of sophists and physicians, and all that they have written about nature, belongs rather to the business of writing than to medicine itself. I believe also that it is not possible to obtain anywhere more exact knowledge concerning the nature of man than from medicine. This knowledge is only possible through an accurate and comprehensive understanding of medicine.

Here we have for the first time an authoritative voice proclaiming a divorce between speculative philosophy and the healing art.

—*Major*

Chemosurgery in the Treatment of Carcinoma of the Skin

RICHARD A. SHEPARD, M.D., D.D.S., D.A.B.

OAKLAND, CALIFORNIA

TEN years ago Dr. Frederick Mohs presented a paper on chemosurgery at the annual meeting of the California Medical Society in Los Angeles. Several members of the departments of surgery and radiology at Stanford were impressed with Dr. Mohs' report and subsequently made plans to use this method at Stanford University Hospital Clinics in selected cases of cutaneous carcinoma. It has proved to be a welcome addition to the conventional surgical and radiologic technics at the University.

Chemosurgery is an ingenious method of therapy conceived and developed by Mohs at the University of Wisconsin Medical School more than twenty years ago. It combines the chemical destruction and fixation of tissue with surgical excision and orderly microscopic survey of the excised specimens. The basis for this method was Dr. Mohs' observation that a 20 per cent solution of zinc chloride in a suitable pastelike medium destroyed and fixed "*in situ*" tissue to which it was applied. The depth and extent of destruction are controllable, and tissue so treated shows no significant alteration of the cellular morphologic pattern. The use of a specialized frozen section technic completed the development of this method, which gives one, in effect, microscopic control of excision. The basic virtues of chemosurgery are increased certainty of complete removal of the tumor and minimal destruction of normal tissue.

To the plastic surgeon this method has a limited but, nevertheless, significant area of usefulness. In my experience, its greatest value has been in the management of certain recurrent, usually extensive, basal cell lesions, particularly those related to the ear, facial nerve, inner canthus and nasolabial fold.

In the cases of most of the patients I have treated, the tumor has been an aggressive, infiltrating type, with unpredictable extensions along periosteum, perichondrium and fascial planes. The so-called sclerosing type of basal cell carcinoma has also been encountered frequently, because of the difficulty of estimating clinically the extent of infiltration along dermis, so characteristic of these neoplasms. Not uncommonly the tumors were observed to alter their usual habits of superficial extension and invade deeper structures, particularly cartilage.

Most surgeons will agree, I am sure, that conventional surgical excision is usually the simplest and most efficient method of dealing with carcinoma of the skin. It is only in what are called "problem cases" that the chemosurgical technic offers significantly greater assurance of complete removal of the tumor, because of the microscopic control of excision afforded by this method. In such situations, in my experience, conventional frozen section technics in the operating room offer, at best, only spot checks of a given area for residual tumor, and it is easy indeed to miss minute cords and nests of tumor

From the Department of Surgery, Stanford Medical School.

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cells. Microscopic survey of such operative specimens by permanent paraffin sections is often difficult and not infrequently inaccurate, because of the inherent mechanical difficulty of including for survey all margins and surfaces of large, irregular, shrunken formaldehyde fixed specimens.

I should like to present some representative cases to illustrate additional details of technic and to indicate the types of problem that have been selected for treatment by this method.

REPORT OF CASES

CASE 1.—L. H. M., an elderly man, first noted an ulcerative lesion involving the skin of the right postauricular region in 1944. In May 1946, after preliminary biopsy had indicated a basal cell carcinoma, radiation therapy (6,000 r) was given. One year later an additional 6,000 r was given to a recurrence above the previously treated field. The patient returned in six months with a large destructive lesion in the external auditory canal, and radical surgical excision of the right ear and adjacent preauricular tissue was performed. Complete paralysis of the right facial nerve was produced at that time. In January and November 1948, additional radiation therapy was given to recurrences just below the operative site. The patient was referred to me in 1950 with a 2 by 0.5 cm. ulcer below and extending into the bony auditory canal (Fig. 1).

Fig. 1 (Case 1).—L. H. M., patient with ulcer below and extending into bony auditory canal.

The maps (Fig. 2) illustrate the sequence of events following application of the fixative chemical agent to the area visibly and palpably involved by tumor. Treatment is usually carried out at twenty-four hour intervals, although adequate destruction and fixation occur after eight to ten hours. I have arbitrarily chosen the twenty-four hour interval because it permits coordination and does not interfere with my surgical schedule. The destroyed fixed tissue is carefully excised with a scalpel in specimens of varying sizes and shapes. These are marked with dyes to permit orientation and then mapped as illustrated. Similar markings are made on the area being treated, so that after microscopic survey the fixative material may be reapplied only to those areas which contain tumor. The solid lines in each specimen denote a margin to which 5 per cent mercurochrome has been applied; the dotted lines, ordinary household bluing. These dyes are not disturbed by the staining process and permit accurate orientation in delineating areas containing tumor. These areas are indicated on the maps by red markings.

Frozen sections are made from the undersurface of each of the specimens and stained with hemotoxalin and eosin (Fig. 3*A*). Aside from several minor differences in staining procedure, the most novel aspect of this frozen section technic is the care that must be taken in cutting and mounting each piece of tissue on the slides. Each slide must represent every square millimeter of the undersurface of the specimen from which it was cut. One can readily see how vitally necessary a well-trained and conscientious technician is to the efficient functioning of this technic. Minor differences between the zinc chloride fixed tissue and the usual formaldehyde-fixed variety are not significant. The nuclei stain more deeply, and

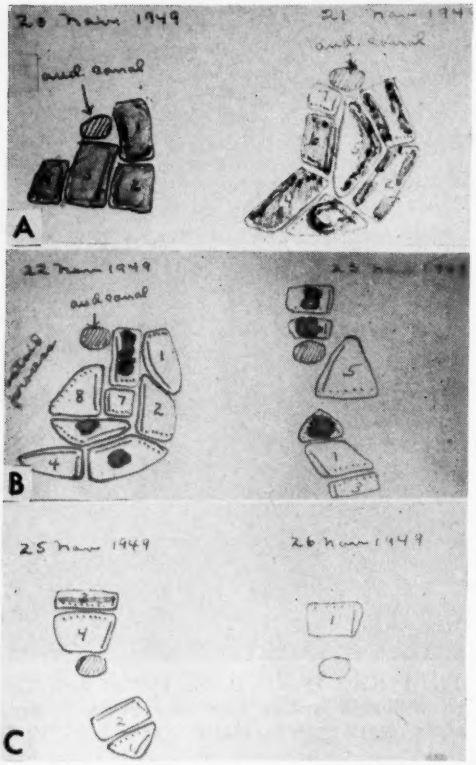

Fig. 2.—"Maps" indicating sequence of events following application of chemical fixative.

there is slight cellular shrinkage, but neither of these variations interferes with recognition of residual tumor cells.

Fixation, excision, mapping and reapplication of fixative material are continued at daily intervals (Fig. 2). Actual excision of the specimens is a painless procedure because one is cutting through destroyed tissue. During the eight-hour to twelve-hour period in which the fixative paste is exerting its effect, however, there is considerable pain, requiring relief by codeine or one of the other morphine derivatives. The specimens are cut so that they usually do not exceed 1.5 to 2 cm. in any one dimension, as it becomes difficult to keep them together in preparing frozen sections if they are any larger. The depth of destruction and fixation can be varied from 1 to 5 mm. or more, but is usually kept at 2 to 3 mm. If one is obviously dealing with a large mass of tumor, it saves considerable time and discomfort if the clinically obvious tumor is excised surgically and chemosurgical exploration begun after this has been done.

A tumor-free plane in this case was reached in six stages, extending over a six-day period. The tumor had extensively invaded the remaining parotid gland, the medial and posterior aspects of the mastoid process and the scalp superior to the auditory canal.

It is not possible with this method to follow these tumors through bone. Several years ago I briefly explored the possibility of using an ionic rapid decalcification technic to accomplish this objective, but made little headway. I am able to follow accurately any projections of tumor along periosteum, and this is helpful in estimating the amount of bone to be destroyed. The actual decision as to the amount of bone to be removed must be based on clinical judgment.

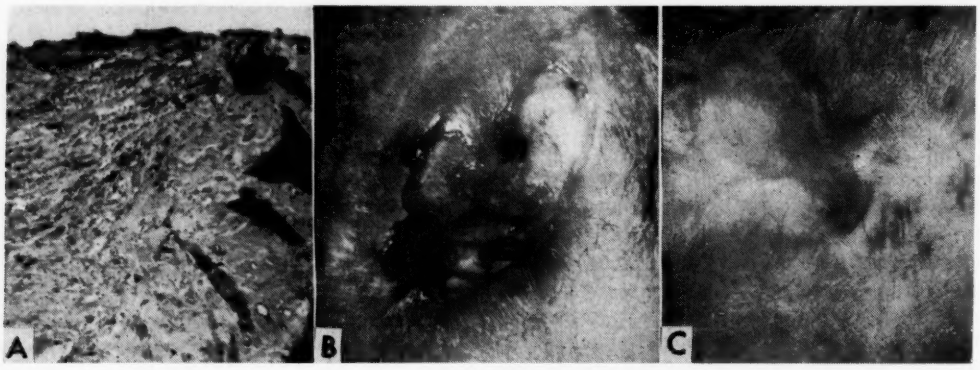

Fig. 3.—*A*, frozen section stained with hematoxylin and eosin. *B*, photograph showing defect produced by chemosurgical method. This was taken late and is therefore misleading (see text). *C*, photograph showing repair (tee text).

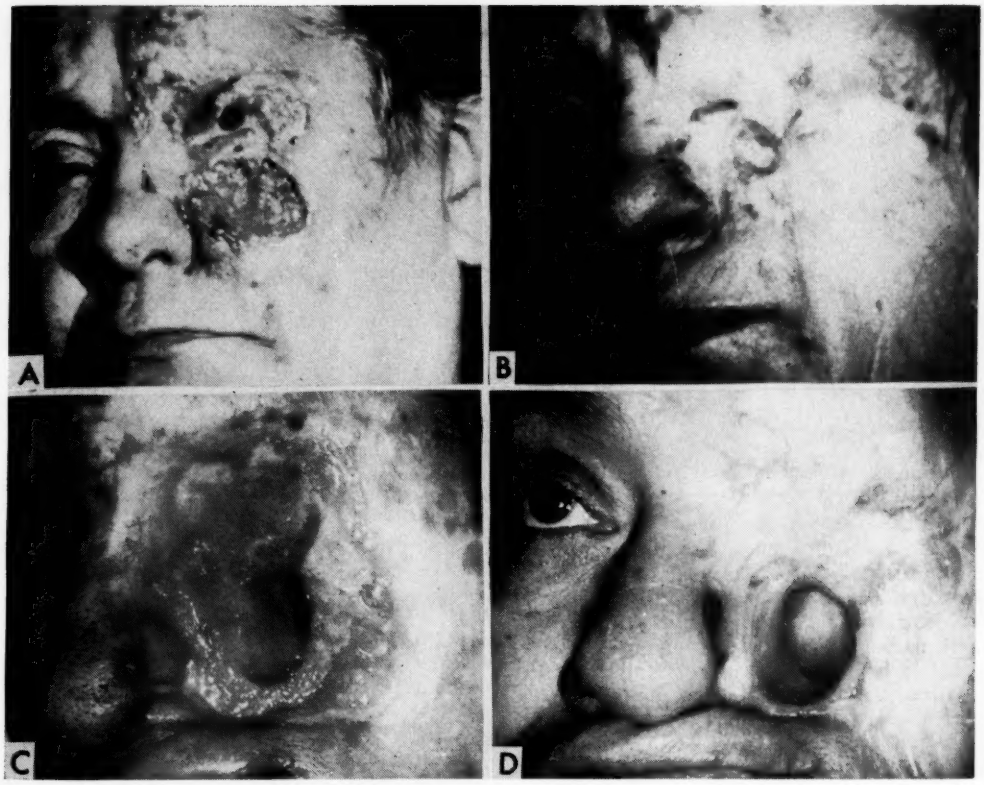

Fig. 4 (Case 2).—A. A., patient with basal cell carcinoma of five years' duration, involving cheek, nose and left upper and lower eyelids (see text).

The photograph (Fig. 3*B*) illustrating the defect produced by the chemosurgical method is actually misleading, as it was taken some weeks after the residual slough had separated and spontaneous epithelization from the wound margins had already started.

Final repair in this case was accomplished by shifting a scalp flap anteriorly with a split thickness skin graft to the denuded area of scalp (Fig. 3*C*). The patient is alive and well, without recurrence, at the time of writing, seven years after treatment.

CASE 2 (Fig. 4).—A. A., a 66-year-old woman, was seen at Stanford Clinic in May 1948. She had a basal cell carcinoma of five years' duration, involving the left upper and lower eyelids, cheek and nose. In June and July radiation therapy, 5,000 r to a 10 by 10 cm. field, was given. An ulcerative lesion of the left ala of the nose, just outside the previously treated field, was noted one year later and treated with an additional 6,000 r. This patient was referred to the chemosurgery clinic in January 1950 with a 12 by 20 mm. ulcer over the left zygoma and a 9 by 3 mm. ulcer just lateral to the external canthus of the left eye. Chemosurgical excision of this recurrent tumor was accomplished in six microscopically controlled stages. There was extensive invasion of the anterior wall of the right maxillary sinus and the anterior portion of the zygoma, as well as the soft tissue of the cheeks, upper lip, nose and eyelids. This patient was free of disease five and one-half years after treatment, when she died of a cerebral vascular accident.

CASE 3.—In June 1950, J. C. reported to his physician with a subcutaneous mass in the right preauricular area. He also had paresis of the right lower eyelid. Local exci-

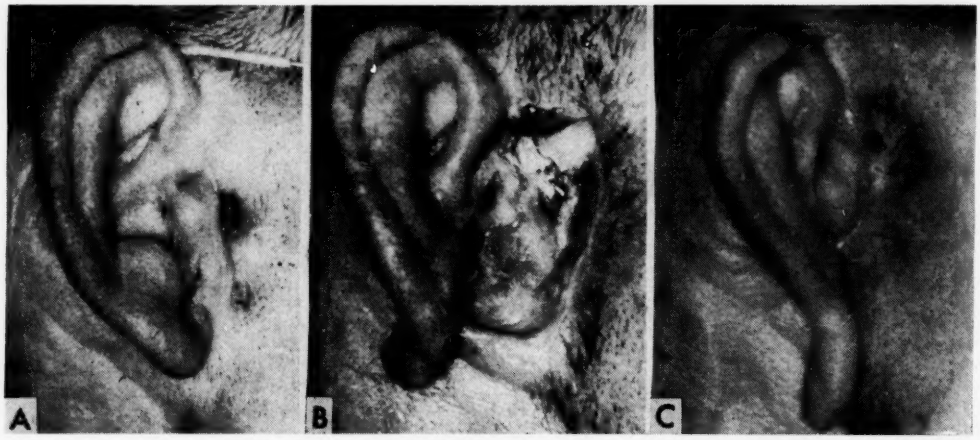

Fig. 5 (Case 3).—Patient J. C., treated in 1950 for subcutaneous mass in right preauricular area, with paresis of right lower eyelid. *A*, recurrent lesion observed in May 1951. *B*, invasion by tumor of soft tissues of cheek and of ear cartilage. *C* and *D*, defect following chemosurgical treatment permitted to epithelize spontaneously.

sion of this subcutaneous mass was carried out, and a diagnosis was made of squamous cell carcinoma of the parotid with invasion of perineurial lymphatics. This patient was then seen at Stanford, and in July 1950 a complete right parotidectomy, combined with a radical neck dissection, was done. In May 1951 a local recurrence in the right preauricular area was noted (Fig. 5*A*).

Chemosurgical excision of this recurrent tumor was accomplished in seven stages, demonstrating extensive invasion of the soft tissues of the cheek and the ear cartilage (Fig. 5*B*). The defect following chemosurgical treatment was allowed to epithelize spontaneously, and subsequently fascial slings were placed to support the paralyzed right side of the face (Fig. 5*C*). This patient is alive and well at the time of writing, without evidence of local recurrence or to the regional nodes.

CASE 4 (Fig. 6).—A lesion of much lesser magnitude occurred in patient A. S., in whom a basal cell carcinoma developed at the base of the left ala at the age of 21. An adequate dose of radiation therapy was given, but recurrence as illustrated was noted approximately four and one-half years later. Basal cell lesions in this area are notorious for their infiltrative qualities. Chemosurgical treatment was chosen in the management of this case in order to insure complete removal of the tumor and yet keep tissue destruction to a minimum. The resulting defect was repaired with a cheek flap with an acceptable end result. This patient is free of disease at the time of writing, seven years after therapy.

CASE 5.—T. G. was referred to me with an extensive, previously untreated basal cell carcinoma of five years' duration, involving the right orbit and the adjacent nose and forehead (Fig. 7*A*). Surgical resection, including exenteration of the orbit, was performed. This was followed by radiation therapy to the skin adjacent to the inner canthus of the left eye. Dual therapy was used because the patient would not agree to surgical resection without assurance that the integrity of the left eye and eyelids would not be jeopardized. Subsequently a large section of the frontal bone was removed and the underlying dura covered with a split thickness skin graft (Fig. 7*B*). Tumor was detected at the margins of this bony specimen, additional resection of the frontal bone was carried out, and a scalp pedicle was shifted into the skull defect (Fig. 7*C*). Three years after the original resection a 1 cm. subcutaneous nodular recurrence was noted at the left margin of the nasal defect, several centimeters below the inner canthus of the remaining left eye. Chemosurgical exploration of this area revealed a fairly well localized nidus of tumor without any evidence of extension along bone (Fig. 7*D*). Neither the inner canthus nor the lower lid of the remaining left eye was disturbed (Fig. 7*E*).

Fig. 6 (Case 4).—Patient A. S., with basal cell carcinoma at base of left ala (see text).

COMMENT

Dr. Mohs, in his recent book, reported five-year arrest in 98.2 per cent of 782 cases of basal cell carcinoma. This is an overall figure, encompassing small and large, primary and recurrent lesions. For lesions measuring 3 cm. or more, comprising about 11 per cent of those in his cases, the incidence of five-year arrest was 87.5 per cent. In practically all of the 200 cases in my series the tumors were of the extensive or recurrent type. This approach to the problem of recurrent carcinoma of the skin has been for me an interesting one. In some instances it has been the only feasible method of treatment and has produced results that amply rewarded me for my time and effort.

The faults and virtues of the chemo-

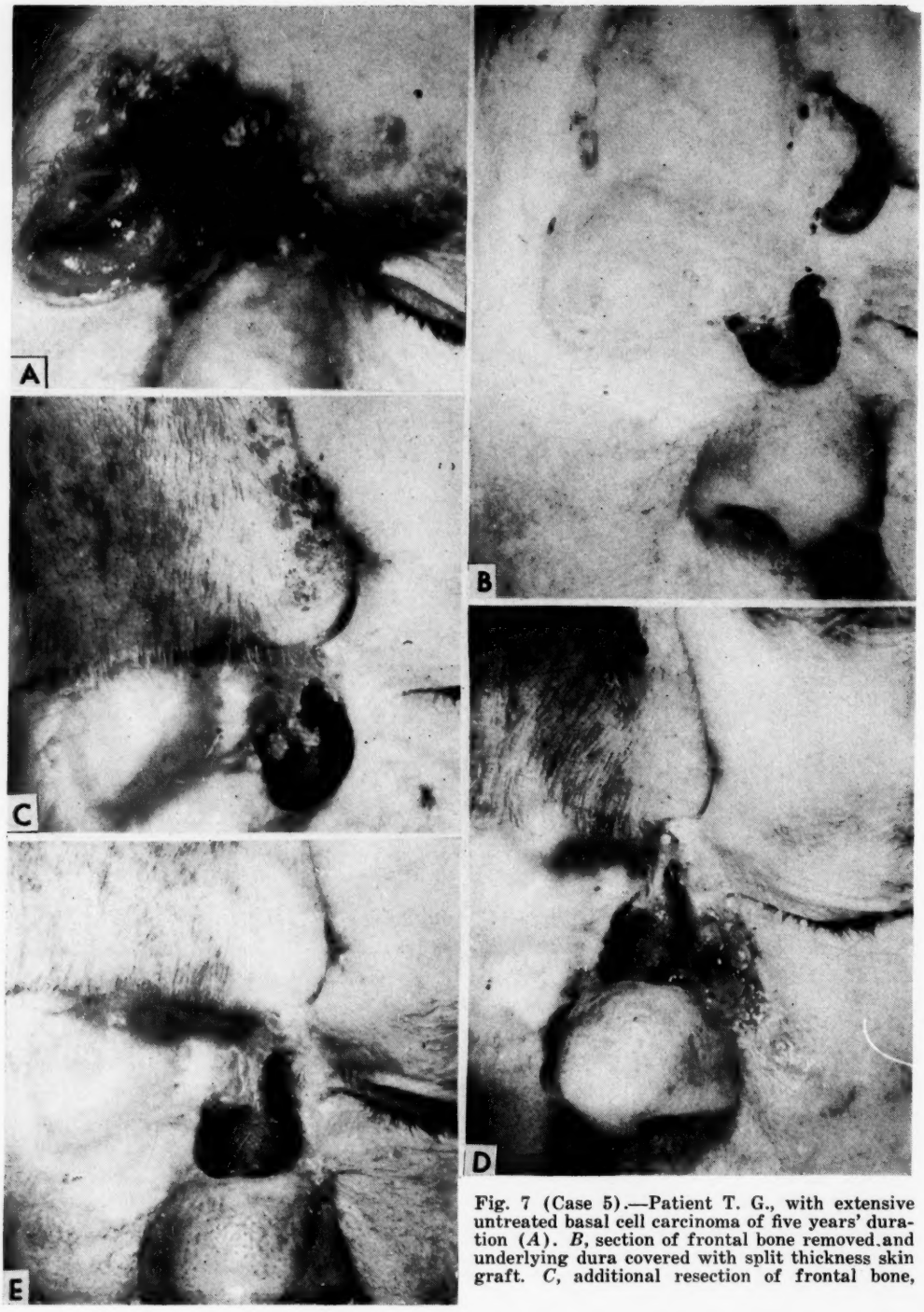

Fig. 7 (Case 5).—Patient T. G., with extensive untreated basal cell carcinoma of five years' duration (*A*). *B*, section of frontal bone removed and underlying dura covered with split thickness skin graft. *C*, additional resection of frontal bone,

with shift of scalp pedicle into defect in skull. *D*, appearance on chemosurgical exploration (see text). *E*, photograph indicating that both inner canthus and lower lid of remaining left eye are intact (see text).

surgical approach can be briefly summarized. It causes a significant amount of pain, demands time and some specialized training for the operating surgeon and requires a well-organized laboratory set-up. On the credit side of the ledger, it permits removal of tumor in certain situations with a degree of accuracy not obtainable with conventional surgical technics and does so with a minimal destruction of normal tissue. It should be a welcome addition to the armamentarium of anyone dealing with carcinoma of the skin.

SUMMARY

Chemosurgery may be defined as a form of therapy that combines chemical destruction of fixation of tissue with surgical excision and orderly microscopic study of the excised specimens. From the point of view of the plastic surgeon its greatest value lies in its usefulness in dealing with certain recurrent and usually extensive basal cell lesions, particularly of the ear, the facial nerve, the inner canthus and the nasolabial fold. In dealing with carcinoma of the skin, conventional excision is usually the simplest and most effective method of treatment, but in certain "problem cases" chemosurgery offers significantly greater assurance of complete removal of the tumor, owing to the microscopic control it affords.

The author reports 5 cases in illustration of these data, in all of which the results of chemosurgery were excellent.

ZUSAMMENFASSUNG

Unter Chemochirurgie versteht man ein Behandlungsverfahren, das die chemische Zerstörung und Fixierung von Geweben mit chirurgischer Ausschneidung verbindet und eine mikroskopische Untersuchung des entfernten Präparates einschliesst. In der plastischen Chirurgie ist das Verfahren besonders wertvoll in Fällen von rückfälligen und gewöhnlich umfangreichen Basalzellenkarzinomen, vor allem am Ohr oder im Gebiete des Gesichtsnerven, am inneren Augenwinkel und in der Nasolabialfalte. Die einfachste und wirksamste Behandlung von Hautkrebsen besteht gewöhnlich in einfacher chirurgischer Entfernung; in gewissen schwierigen Fällen jedoch bietet die Chemochirurgie auf Grund der Möglichkeit mikroskopischer Kontrolle deutlich bessere Aussichten auf völlige Entfernung der Geschwulst.

Der Verfasser berichtet über fünf Fälle, die die obigen Feststellungen erläutern sollen. Bei allen waren die Ergebnisse der Chemochirurgie ausgezeichnet. Das Verfahren sollte von allen Chirurgen als eine willkommene Bereicherung ihres Rüstzeuges zur Behandlung von Hautkrebsen bergrüsst werden.

RESUMEN

Puede definirse la quimiocirugía como una forma terapéutica bien definida que combina la destrucción y fijación química de los tejidos con la excisión quirúrgica y el estudio microscópico de las muestras extirpadas. Desde el punto de vista del cirujano plástico su mayor valor reside en su utilidad cuando ha de enfrentarse con lesiones recurrentes y generalmente extensas basocelulares, especialmente de la oreja, del nervio facial, de la commisura ocular interna y del pliegue nasolabial. En los casos de carcinoma de la piel, la extirpación convencional es del método más sencillo y efectivo de tratamiento, pero en ciertos "casos problema" la quimocirugía ofrece una seguridad mayor de la extirpación completa del tumor por el con-

trol microscópico que proporciona. Para ilustrar estos datos el autor presenta 5 casos, en todos los cuales el resultado de la quimocirugía que excelente, indicando que esta forma de tratamiento debe ser bien recibida para sumarse al arsenal del cirujano cuando es llamado a tratar un carcinoma cutáneo.

RÉSUMÉ

La chimiochirurgie peut être définie comme une forme de thérapeutique combinant la destruction chimique et la fixation de tissus avec l'excision chirurgicale et l'examen microscopique du matériel de biopsie. Elle est en particulier précieuse pour le spécialiste de chirurgie plastique lors de lésions néoplasiques récidivantes et habituellement étendues, (cellules basales) surtout de l'oreille, du nerf facial, de l'angle externe de l'oeil et du pli nasolabial. En cas de carcinome de la peau l'excision classique est en général la méthode la plus simple et la plus efficace, mais dans certains cas complexes la chimiochirurgie assure une ablation plus complète de la tumeur grâce au contrôle microscopique.

L'auteur rapporte 5 cas traités avec succès selon cette méthode, dont l'emploi est à encourager.

RIASSUNTO

Per "chemiochirurgia" si intende forma di terapia che combina la fissazione e la distruzione chimica dei tessuti alla loro asportazione chirurgica e successivo esame istologico. Per il chirurgo plastico essa è del maggior interesse nella cura di certe lesioni a cellule basali, recidivanti e di solito diffuse, che si verifino specialmente nell-orecchio, nel nervo facciale, nel canto interno e nella piega nasolabiale. La cura tradizionale del cancro cutaneo è rappresentata dall'escisione chirurgica, che è il metodo più semplice e più efficace; in certi casi, tuttavia, la chemioterapie fornisce maggiori garanzie di asportazione definitiva e completa del tumore.

L'autore riferisce 5 casi a sostegno di questa affermazione; i risultati furono eccellenti e indicano che questo nuovo tipo di cura deve entrare nel bagaglio di ogni chirurgo che intenda trattare i cancri cutanei.

Letter to a Group of Country Doctors

. . . Our profession is one of self-control, of devotion, of sacrifice; it is truly a ministry. You are aware of this more than any one else, you, my colleagues in the country, whose days and nights are dedicated to the alleviation of suffering humanity and who never deny your help either day or night, without worrying about whether your labors will be rewarded. "My best patients are the poor," said the great Boerhaave, "because the Lord has taken it upon Himself to pay me for them."

—*Cruveilhier*

The Management of Vascular Tumors

KATHRYN LYLE STEPHENSON, M.D., F.A.C.S., F.I.C.S.

SANTA BARBARA, CALIFORNIA

THIS article will be limited to congenital vascular tumors of the skin and subcutaneous tissues. Hereditary hemorrhagic telangiectasis will be mentioned only to illustrate the possibility of a systemic condition related to the presence of a hemangioma. Brief mention will be made of certain malignant lesions which, clinically, may be confused with hemangioma and, from a therapeutic point of view, necessitate radical surgical intervention.

These tumors are the results of embryonic sequestrations of vasoformative tissue. The endothelial buds may form hemangiomatous or lymphangiomatous tumors. I agree with Innis[1] that classification of these tumors is extremely diffi-

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Fig. 1.—Case of K. M., Feb. 12, 1952, and April 2, 1955, respectively. Infant, first seen at age of 8 months, had rapidly expanding tumor of left cheek that had previously been given two applications of radium. Increase in size continued, and tumor encroached on nasal and orbital areas. At age of 14 months, on Feb. 13, 1955, capillary hemangioma of skin and muscle was excised.

A
B
C
D

Fig. 2 (*opposite*).—*Upper left*, patient K. M., with alopecia due to irradiation for hemangioma. *Upper right*, patient J. C., who had desquamating telangiectatic scar, present at age of 4 years, caused by radioactive phosphorus used in treatment of hemangiomas. *Lower left*, patient H. Q., who had limited vision in left eye (owing to cataract), loss of eyelash and eyebrow and redundant scarring of skin following application of radium to hemangioma of temporal area. *Lower right*, patient A. G., with desquamation and carcinoma fifty years after radium therapy.

cult, because the microscopic structure of the malformations often reveals vascular tissues of great diversity.

Hemangiomas and lymphangiomas are benign tumors as judged by the histologic analysis of the tissue. So far as the pa-

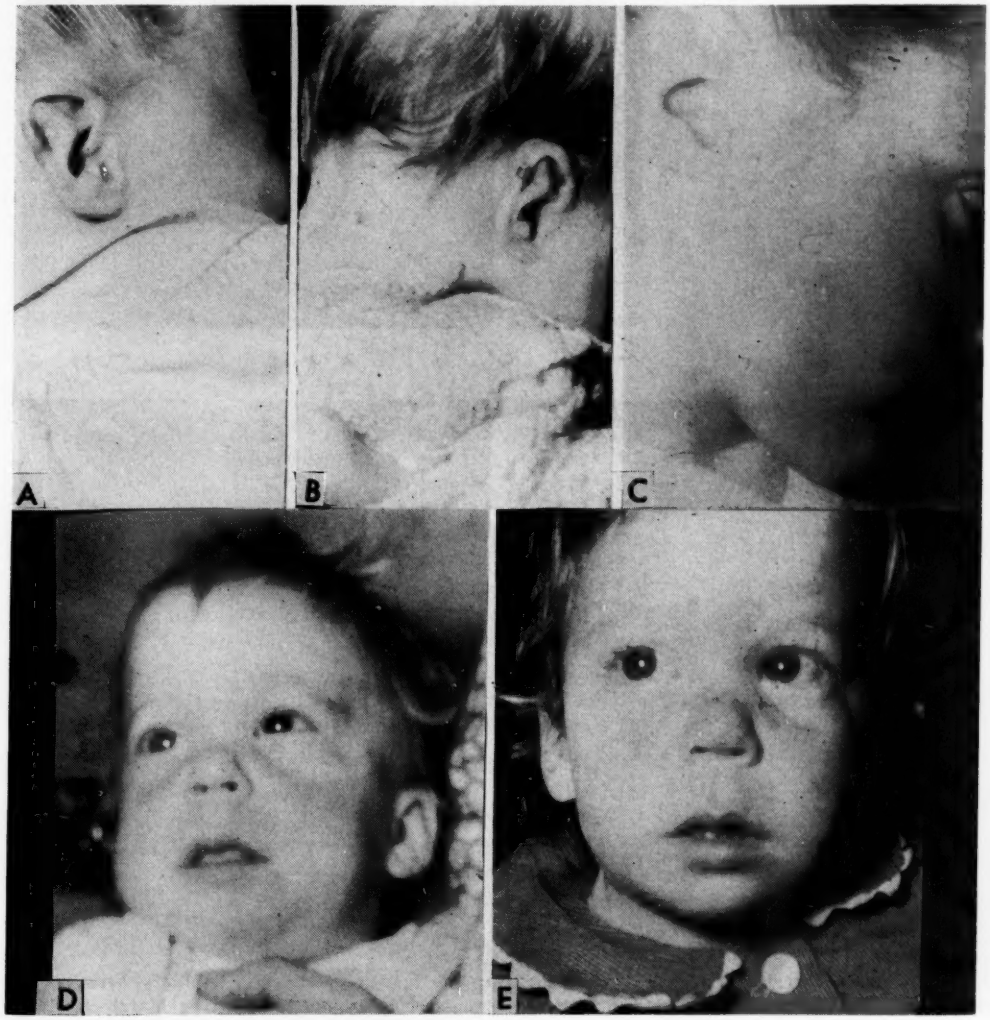

Fig. 3.—*A*, *B* and *C*, case of C. M., May 20, 1953, March 4, 1954, and March 4, 1957, respectively. Hemangioma noticed shortly after birth. Sclerosing solutions injected on May 20 and July 15, 1953. *D* and *E*, case of D. L., Nov. 23, 1955, and Dec. 28, 1956, respectively. Capillary hemangioma of left lower eyelid was present at birth, did not grow rapidly and was excised on Dec. 14, 1955, when child was 18 months old.

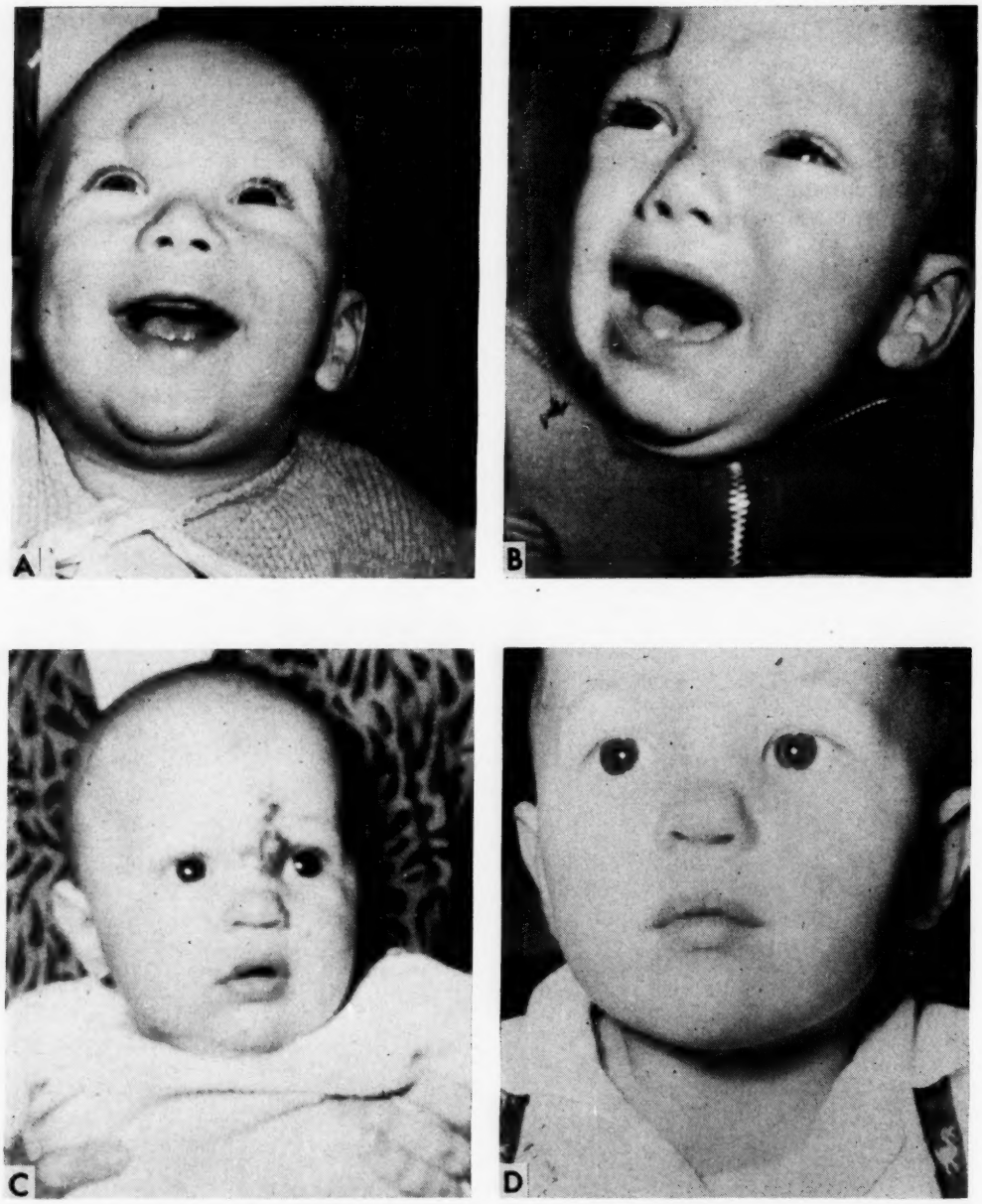

Fig. 4.—*A* and *B*, case of P. D., Feb. 23 and Dec. 14, 1953, respectively. Capillary hemangioma treated by injection of sclerosing solution elsewhere on six occasions. Excised on March 23, 1953. *C* and *D*, case of R. R., May 5, 1955, and Feb. 14, 1957, respectively. Rapidly growing capillary hemangioma seen at 3 and 5 months of age and treated by planned partial excision at 6 and 12 months of age. Bulk of tumor was excised and large vessels ligated, with injection of tip of nose with sclerosing solutions, on July 6, 1955. Residual hemangioma excised on Dec. 21, 1955.

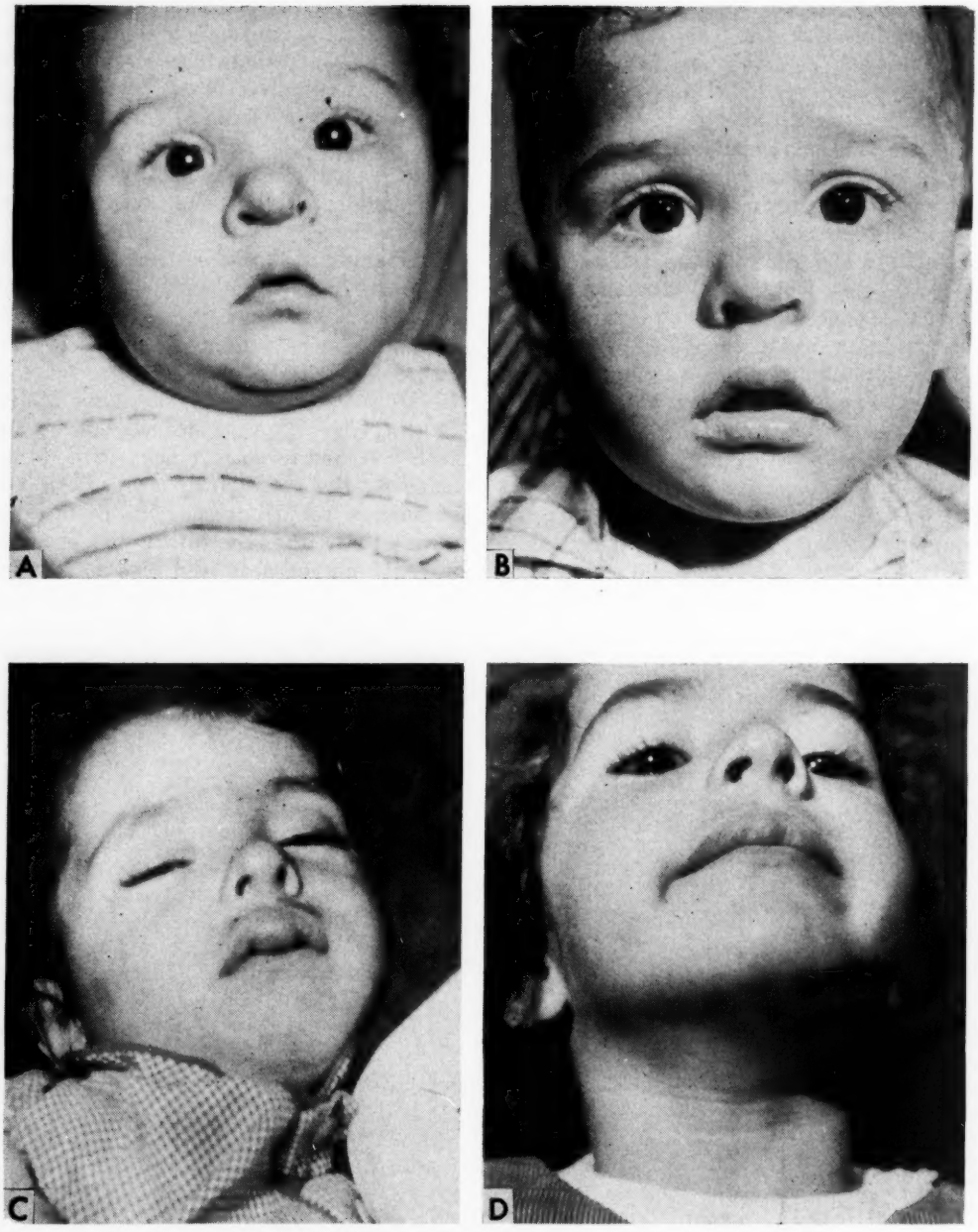

Fig. 5.—*A* and *B*, case of G. S., June 15, 1956, and May 27, 1957, respectively. Tumor noted at 2 months of age and increased rapidly in size in sixth and seventh months of life. Bulk of tumor excised through intranasal incision on June 16, 1957. Sclerosing solutions injected on April 23, 1957. *C* and *D*, case of L. P., Nov. 11, 1953, and Aug. 28, 1957, respectively. Capillary hemangioma of nose and lip was excised through intranasal incision and mucous membrane of lip when infant was 7 months of age.

tient is concerned, these tumors are not benign, because they are invasive and destructive. Not only do they cause deformity that is sometimes irreparable, they occasionally kill by hemorrhage or sepsis. It is established that the majority of the hemangiomatous tumors ultimately regress.[2] During the period of growth considerable damage may have resulted (Fig. 1). The clinical course of these tumors is not compatible with the microscopic evidence of regression if thrombosis and fibrosis are indicative of regression. Unfortunately, there are as yet no clinical or microscopic criteria by which one can determine in advance the course the individual tumor will take. The infiltrative growth of these tumors has been stated by Stout[3] to be due to "the sprouting of endothelial cells from pre-existing capillaries growing first as solid cords and secondarily becoming canalized." The factors that limit the growth are unknown. The absence of signs thought to be indicative of progression, that is, the absence of isolated outriders from the main mass of the tumor or of large communicating systemic veins, is not a reliable basis on which to make a judgment with regard to the advisability of undertaking or withholding therapy in the individual case.

Hemangioma is the most common tumor of infancy, and the incidence is often stated to be 10 per cent. The frequency of such tumors present at birth is variously stated as between 50 per cent and 75 per cent. The last 4,000 births at the St. Francis and Cottage hospitals were reviewed, and in no instance was notation made by the obstetrician or pediatrician of such a tumor present at birth. This means that either the tumor was so small it could not be seen and was to become apparent only later, after the infant was

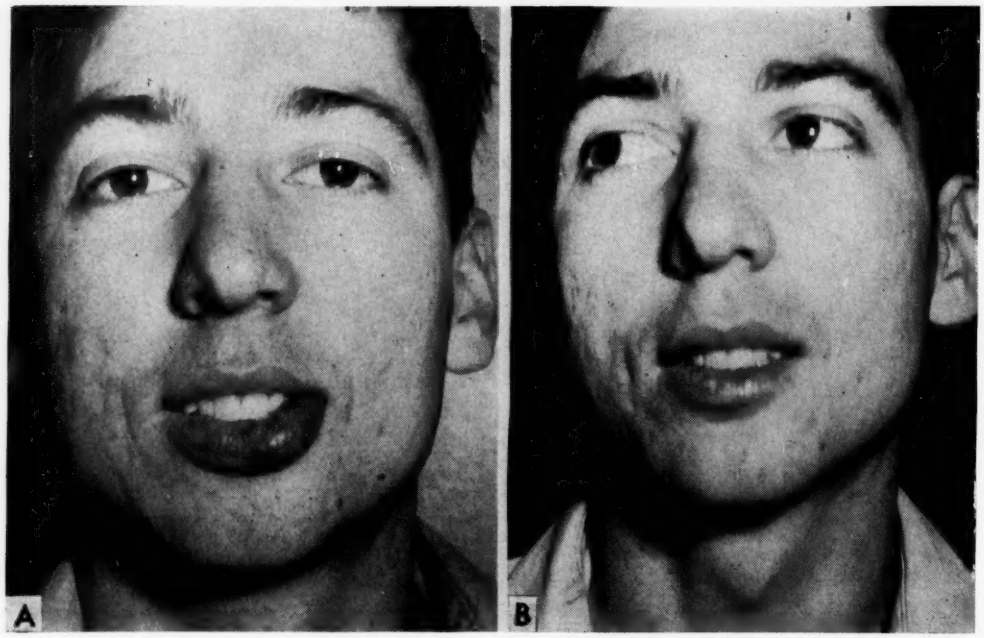

Fig. 6.—Case of K. H., aged 24, April 20 and Nov. 13, 1953, respectively. Tumor involving mucous membrane of lip and right cheek treated by excision on April 23, 1953; injection therapy for residual discoloration of vermilion border given on Sept. 5, 1953, and on Jan. 11 and April 10, 1954.

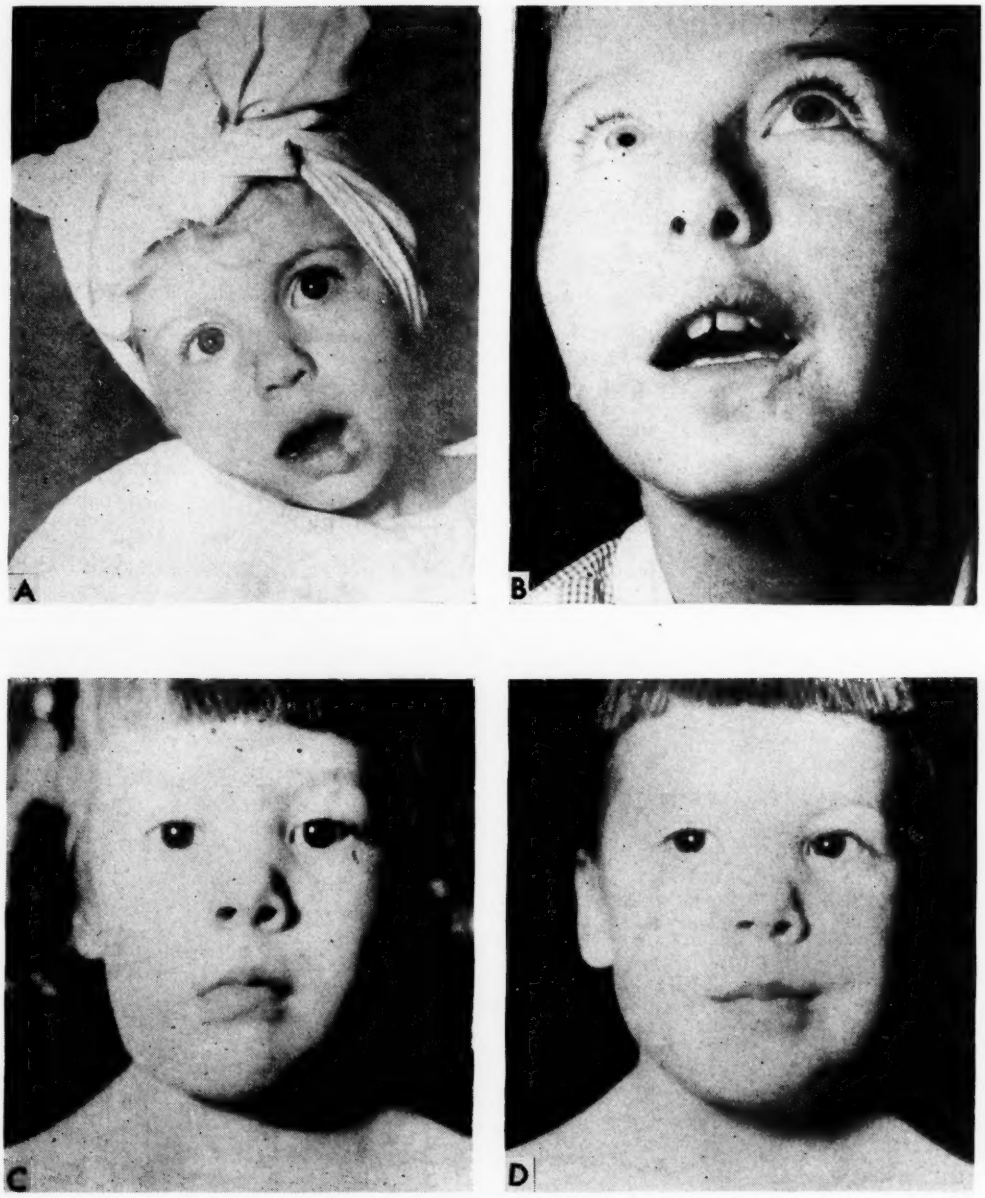

Fig. 7.—*A* and *B*, case of D. M., July 7, 1954, and March 5, 1958, respectively. At age of 7 days lesion of lip was noticed and increased rapidly. Treated at 4 weeks of age with radium. Ulceration and tissue loss resulted. Residual hemangioma extending to alveolar ridge excised on July 12, 1954. Scar revised on April 5, 1955. *C* and *D*, case of E. C., Dec. 12, 1957, and March 20, 1958, respectively. Tumor of right cheek, present since birth and gradually increasing in size, excised at 4 years of age through submandibular incision on Feb. 25, 1958.

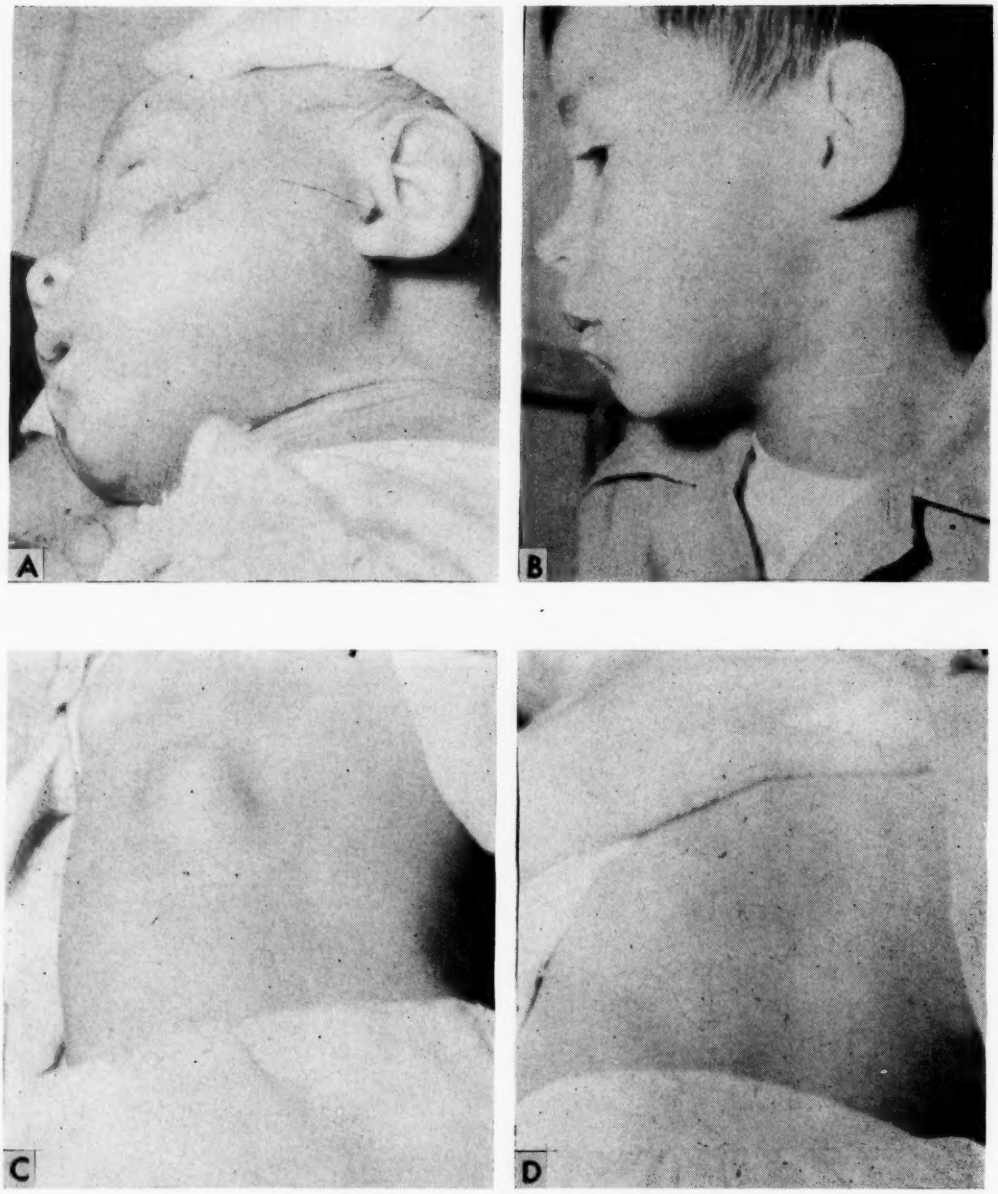

Fig. 8.—*A* and *B*, case of F. R., Dec. 28, 1951, and March 4, 1958, respectively. Rapidly growing infantile hemangioendothelioma of left cheek in infant 3 months of age, treated by ligation of external carotid artery and partial excision of tumor on Sept. 28, 1951, followed by implantation radon seeds under direct visualization. No recurrence of tumor or seventh nerve loss. *C* and *D*, case of M. M., an infant 5 months old with capillary hemangioma of scalp, toe and back, Aug. 29 and Nov. 30, 1956, respectively. Tumor of back excised and lesions of toe and scalp treated by injection on Sept. 13, 1956.

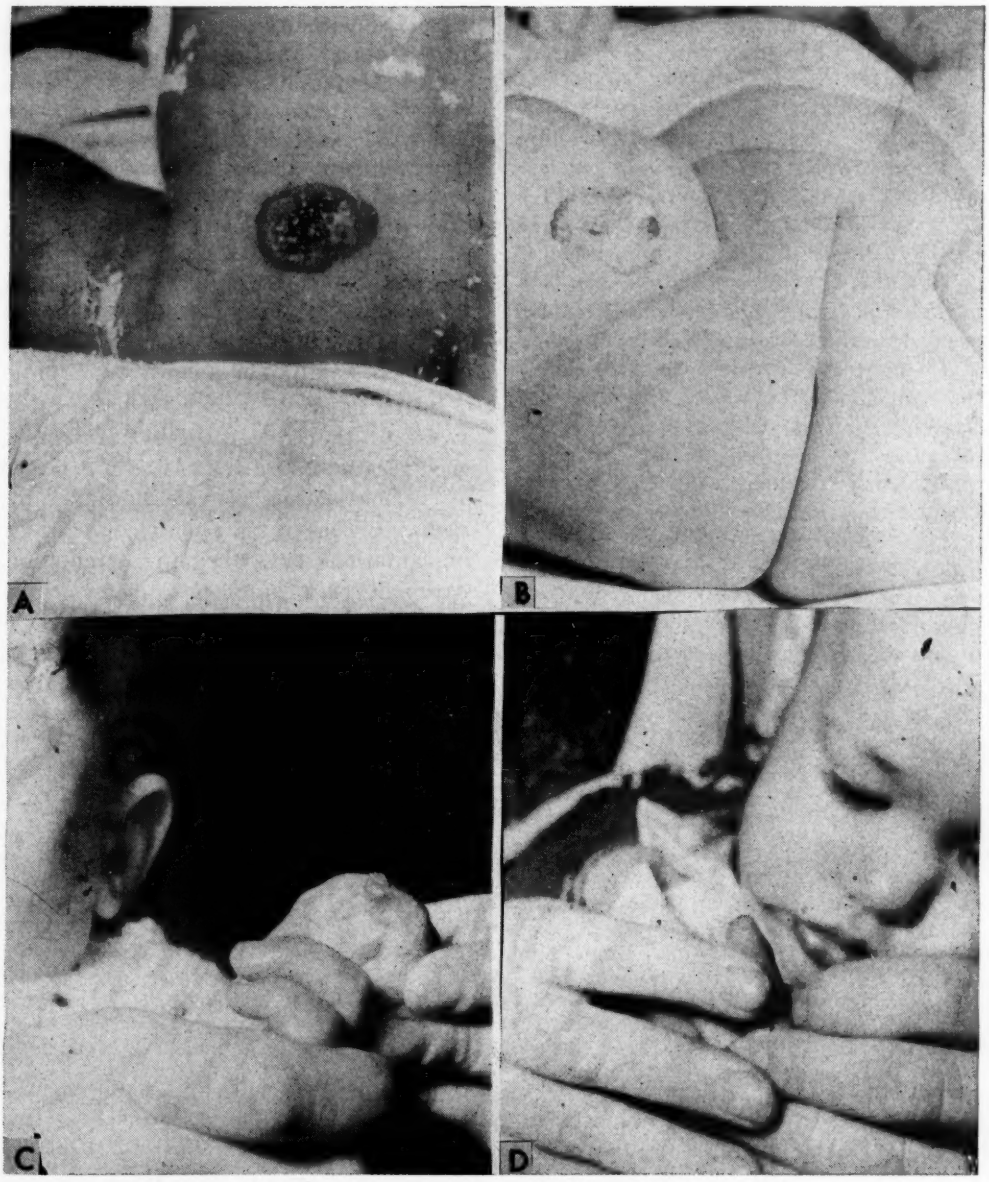

Fig. 9.—*A* and *B*, ulcerative lesions in area of contamination treated by excision. *C* and *D*, case of D. R., Aug. 17 and Oct. 21, 1951, respectively. Hemangioma of finger present since birth, treated by two injections of sclerosing solution.

older and the blood pressure sufficient to distend the vessels fully, or that the examining physicians were not aware of the significance of this tumor to the welfare of the infant. On reviewing the literature and the photographs illustrating it, one

rarely sees an extensive lesion present at birth; rather, its appearance in an infant several weeks or months of age is presented. The usual history is that these lesions first appeared as a minute swelling or red area that increased more or less rapidly in size. It would be advisable for every mother to be warned that, if after the baby leaves the hospital, a birthmark should appear, she should immediately seek consultation and that the physicians should refer the child's case to well-trained and experienced specialists rather than wait hopefully until the lesion spontaneously disappears. This delay means letting a percentage of them advance, the minimal consequence of which will be an area of atrophic skin that may necessitate a plastic revision. Until criteria are established by which one is able, on the initial examination or within a short time, to make a judgment as to whether the tumor is of the involuting or noninvoluting type, I am in accord with Andrews,[2a] Brown,[4] Modlin,[2c] Owens,[5] and others who advocate immediate treatment of these lesions when first encountered. I do not consider the lesion too small or the infant too young for treatment to be instituted in most instances. Much more formidable operations are performed on newborn infants with other congenital anomalies. Consequently, if the lesions are small, either the injection of sclerosing solutions to control the growth or excision of the lesion, with local anesthesia, is indicated.

In the hands of well-trained therapists aware of the dangers of overtreatment, good results have doubtless been achieved by various forms of radiation therapy, such as the use of radiation plaques, radon implantations or external irradiation. Atrophic skin subject to later carcinomatous changes, alopecia, cataract or altered bony growth may result, however,

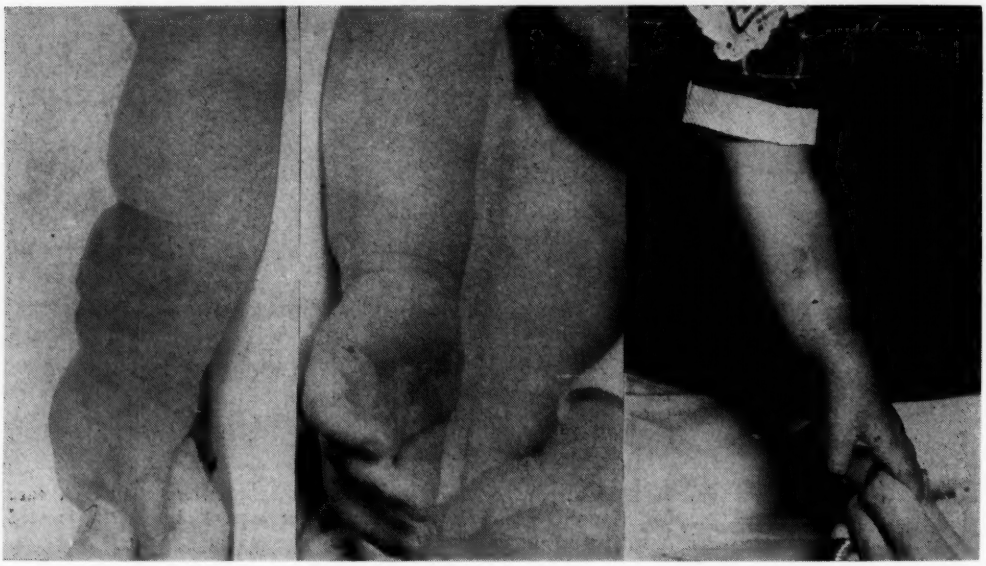

Fig. 10.—Case of G. B., Aug. 28 and Sept. 15, 1951, respectively. Tumor of arm noted at 10 days of age. Bulk of tumor excised, large vessels ligated and skin graft applied to arm. Injection of hand with sclerosing solution on Sept. 7, 1950, at 3 months of age. Excision of skin graft and tumor, thenar eminence, Jan. 11, 1951.

from the injudicious use of radiation therapy (Fig. 2).

Therapy must be individualized. Although it has been my policy to excise the lesion *in toto*, in certain areas on the face and in the hand I prefer the use of sclerosing solutions. Occasionally a two-stage surgical attack may be necessary in order to achieve the best cosmetic result. I have reserved the use of interstitial radon seeds of 0.10 to 0.25 millicuries for tumors of the parotid.

On the eyelid and the ear, sclerosing solutions have been used if the skin was involved. If the skin is intact on the eyelid, surgical excision is employed (Fig. 3).

On the forehead the lack of available skin for mobilization and approximation is a problem, and here also sclerosing solutions are of value.

In the nasion area surgical excision can be undertaken satisfactorily with a good end result (Fig. 4, *A* and *B*). This may necessitate planned procedures (Fig. 4, *C* and *D*). Ligation of the larger anastomosing vessels and excision of the bulk of the tumor and a portion of the involved skin are performed at the first stage. At the second stage the residual skin tumor is removed. Both procedures are undertaken within a short period. If the tumor extends down to the tip of the nose, the injection of sclerosing solutions offers the best result. The tip of the nose may be approached surgically from within the nostrils. After excision of the tumor tissue the wound is swabbed with a sclerosing solution (Fig. 5).

The lip lesion is approached from within the mucous membrane surface when possible, and later injections of sclerosing solutions are used to control the discoloration of the vermilion border (Figs. 6, 7*A* and 7*B*).

For a lesion on the cheek surgical excision is indicated. Available tissue for closure without a complicated mobilization

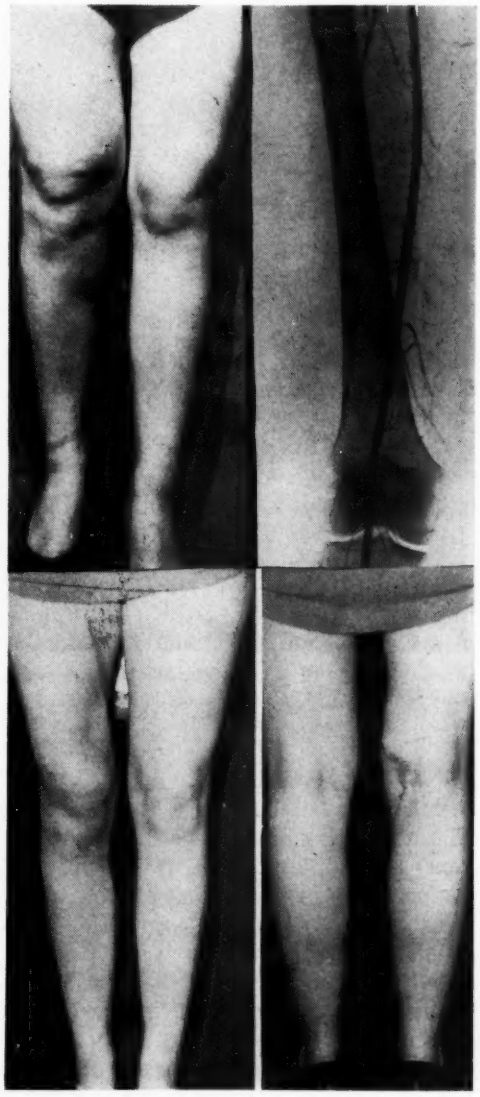

Fig. 11.—Case of B. P., Aug. 2 and 11, 1957, and Feb. 21, 1957, respectively. Small vessels and increased size of right thigh noted on infant shortly after birth. At age of 15 years, right extremity longer than left and 5 cm. greater in diameter. Arteriogram shows femoral artery well filled and abnormal small arterial branches extending from lower branches. Second film shows dye to pass through venous circulation and residual in small arteries of soft tissue mass. Operation performed on Aug. 13, 1957. Pathologic diagnosis: "Disseminated multiple congenital hemangioma."

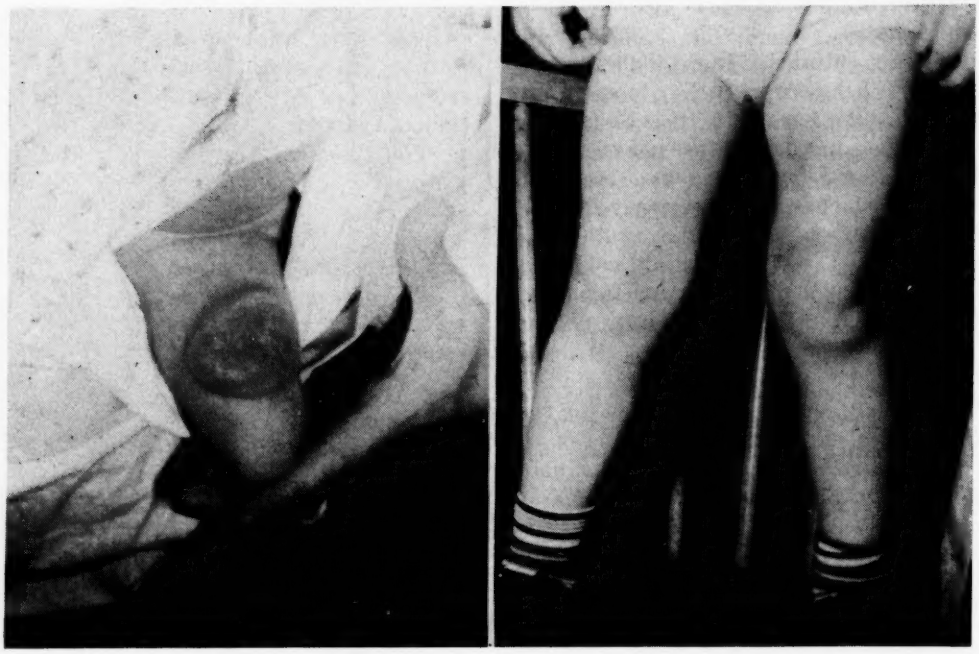

Fig. 12.—Case of R. M., Oct. 26, 1954, and Feb. 20, 1958, respectively. At 3 weeks of age capillary and cavernous hemangioma noted but infant in poor nutritional state and anemic. Tumor increased rapidly and was excised on Jan. 24, 1955, when infant was 3 months old. Scar revised on Feb. 20, 1958.

technic is available (Fig. 7, *C* and *D*). The nerve stimulator is used to help prevent nerve injury. In cases of parotid tumor, as has been indicated, the tumor is excised as thoroughly as possible without damage to the seventh nerve, and then, under open visualization, the 0.10 to 0.25 millicurie radon seeds are inserted (Fig. 8, *A* and *B*).

For lesions on the thorax and abdomen, simple excision is generally the preferable form of therapy (Fig. 8, *C* and *D*). Occasionally, extensive growths with central pallor and no evidence of anastomosis with large vessels have been observed and operation postponed. I have preferred to postpone surgical intervention because a skin graft to this area would be little improvement over atrophic skin. Ulcers in areas of contamination are excised (Fig. 9, *A* and *B*).

Hemangiomas of the extremity present a somewhat different problem. Here multiple small arteriovenous fistulas are more common and infiltration of muscle more frequent. Johnson, and his co-workers[6] and Jenkins and his associate[7] have well presented the problem. These tumors may be massive and painful and may secondarily alter the bony structure of the limb. When the hand is involved, because of the intricate structures essential to function, I have attempted to control the growth by ligation of vessels above the wrist and injection of the smaller vessels in the palm and fingers (Fig. 9*C*, 9*D*, 10 and 11). Occasionally it is necessary to intervene surgically and excise a portion of the involved tissue. Rarely, excision with coverage by a skin graft is indicated in order

Fig. 13.—Case of E. M., April 14, 1956, March 21, 1957, April 13, 1956, and Aug. 30, 1957. Patient, aged 45, had fallen on forehead at age of 4. Had steadily enlarging and extending vascular tumor that increased notably during pregnancy. Typical "bag of worms" appearance, with bruit and thrill. Patient had headaches, ringing in ears and epistaxis. Multiple operations were necessary to gain control of lesion. Initial ligation of temporal and transverse facial arteries with elevation of forehead flap and excision of enlarged vessels on April 3, 1956. Further excision of orbital vessels and injection on June 13, and skin graft to eyelid on Nov. 26, 1956. Arteriogram taken on Aug. 30, 1957, showed abnormal shunt of dye into ophthalmic division of internal carotid artery. Ligation of postauricular and nasal areas with further ligation in orbital area on Dec. 12, 1957. Pathological diagnosis: "Irregular folded cavernous spaces lined with cuboidal endothelial cells and having loose fibrous connective tissue wall. Communicating with this space is a small artery which shows mural hyalinization, fragmentation, fraying and degeneration of elastic fibers."

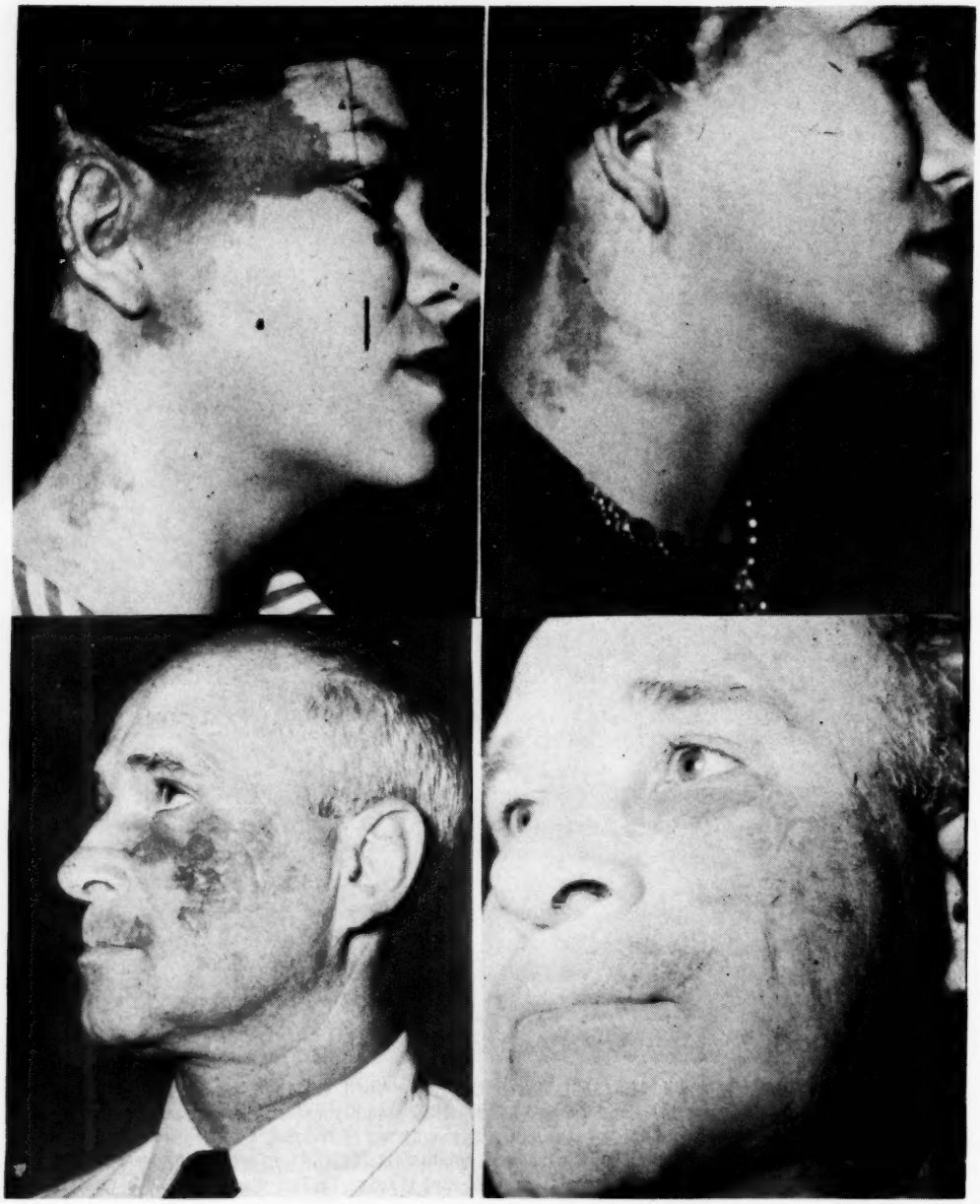

Fig. 14.—*Above*, case of D., aged 26, Aug. 13, 1952, and Feb. 12, 1954, respectively. Angioma simplex, treated by partial excision on Feb. 6, 1951, and April 9, 1953. *Below*, case of E. J., Feb. 3, 1951, and April 18, 1955, respectively. Port wine stain present at birth and treated with carbon dioxide when patient was a child. Partial excision done on Feb. 6 and April 9, 1951. Pathologic picture: Cavernous venous channels dilated and adnexal epithelioma.

to obtain a better cosmetic appearance. Operation is facilitated by use of a tourniquet. On the extremities is should be noted that scars are often less satisfactory than elsewhere; after the patient has achieved growth, however, these can be modified (Fig. 12).

In cases of extensive arteriovenous (cirsoid) aneurysms, the tumor may extend locally by incorporation of adjacent vessels. It is necessary to ligate the larger vessels and excise the communicating vessels. Multiple operations may be necessary. Injection of the smaller vessels with sclerosing solutions is valuable (Fig. 13).

The port-wine type of capillary hemangioma is lined by a squamous cell endothelium of a more nearly adult type. Such a hemangioma usually grows with the child, although it may occasionally become hypertrophic and rarely is associated with underlying arterial venous type of vascular communication. The light pink discoloration seen on the newborn often fades and requires no therapy. The larger port-wine stains generally can be satisfactorily covered with a cosmetic paste; many patients, however, dislike doing this. In my opinion it is preferable to a skin graft. Irradiation, carbon dioxide snow and tattooing I have abandoned as unsatisfactory. I have not used Thorium-X but it is interesting to note that Wallace,[2d] reviewing Bowers'[8] cases, has stated that in no instance has the staining completely disappeared as a result of this method of treatment. Brain[9] has corroborated this. Many such lesions lend themselves to the multiple partial excision technic, but extreme care must be taken in utilizing this method in the areas about the eye, lip, and nasolabial fold, or distortion will result (Fig. 14).

Lymphangiomas.—From the point of view of management it is well established that the lymphangiomatous tumors show little response to irradiation and limited

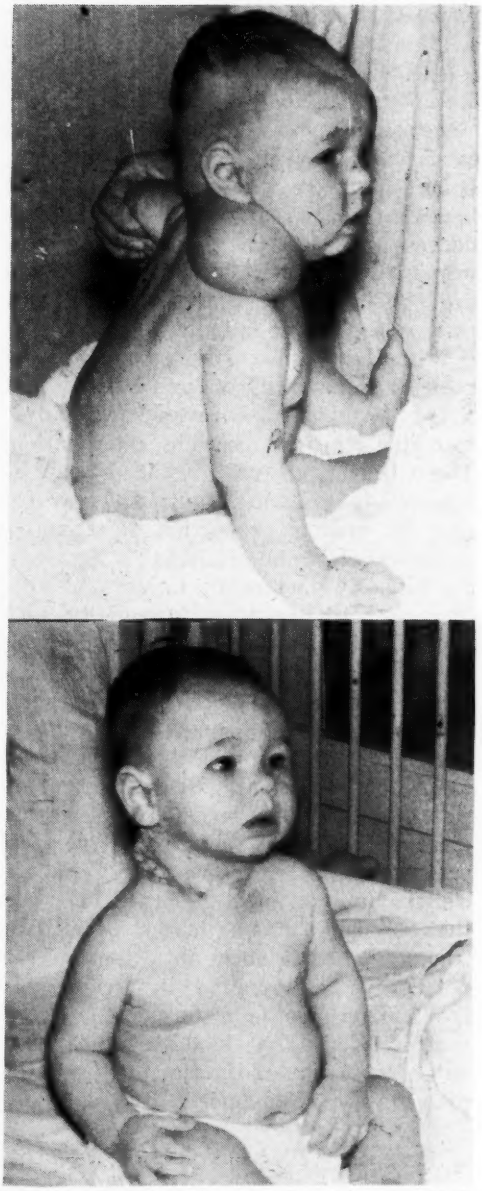

Fig. 15.—Case of J. S., Jan. 15 and Jan. 25, 1949. Infant first seen at 3 months of age, because of tumor present since birth and increasing in size. Returned at six months of age as respiratory emergency associated with infection of upper respiratory tract. Roentgen study revealed no chest involvement and on Jan. 17, 1949, tumor was excised. Pathologic diagnosis: Cavernous cystic hygroma.

response to the injection of sclerosing solutions. Surgical intervention is indicated for eradication. The superficial dermolymphangioma circumscriptum usually does not pose a serious problem. The cavernous and cystic type of lesion often is difficult from the surgical standpoint because the tissues extend around the nerves and between the muscles. Approximately 50 per cent of these tumors are noted at birth, and again operation as soon as feasible is indicated.

With regard to cystic hygromas of the neck I agree with Gross and Huritt[10] and Briggs and his collaborators,[11] who advocate the earliest possible intervention. These lesions, in most instances, can be removed before the infant is 1 year old and the greater proportion of those remaining before the infant is 3. This is a continuously increasing tumor and may increase with considerable rapidity as a result of infection of the upper part of the respiratory tract, owing to spontaneous or secondary hemorrhage. A serious emergency situation can result, owing to pressure of the lesion on the trachea or to ulceration and sepsis. Briggs and others reviewed the various large series of hemangiomas treated by irradiation and surgical excision and showed conclusively that excision is the treatment of choice. The fact that these tumors may enter the mediastinum, and that such an extension can not always be determined by preoperative roentgenograms, is a foremost surgical consideration. One should be prepared to enter the thorax at the time of the initial procedure or secondarily. Swabbing any residual tumor with sclerosing solutions has been satisfactory in the experience of most surgeons (Fig. 15).

Malignant angiomatous tumors, such as the hemangioendothelioma, the pericytoma, the lymphangiosarcoma, the reticulum cell sarcoma and various lymphoblastomas, often cannot be differentiated clinically; only by surgical excision, with material for histologic examination, can a diagnosis be established and radical therapy instituted. Although these lesions are rare, they must be recognized. Watchful waiting may be fatal (Figs. 16 and 17).

SUMMARY

Until criteria are established that will definitely differentiate the aggressive from the regressive angiomatous tumors, so far as the welfare of the individual patient is concerned, these tumors are best managed by surgical excision.

Surgical excision should be undertaken at the first appearance of the tumor. Often this can be accomplished with local anesthesia or on an outpatient basis with brief general anesthesia.

Management is minimized by early surgical intervention, which prevents extension of the growth.

In no instance has a tumor recurred after surgical excision in the author's series, despite the fact that many patients have been operated on during a period of tumor growth.

The data here presented are illustrated with photographs showing various lesions and their course under treatment by divers methods.

Fig. 16 (*opposite*).—Case of J. H., June 24, 1954 (*upper views*) and July 19, 1955 (*lower views*), respectively. Infant, first seen at age of 3 weeks, had large tumor present at birth. Treatment was sought because of increasing size of tumor. The anterior, lateral and posterior aspects of thorax, right arm, sublingual and orbital areas of anterior, lateral and posterior portions of thorax were involved. Mass of tumor excised from abdomen and thorax anteriorly, laterally, and posteriorly on July 5, 1955. Pathologic diagnosis: "Congenital cavernous lymphangioma, well vascularized. Some interstitial hemorrhage present. Axillary lymph node with 95 per cent involvement by cavernous lymphatic channels."

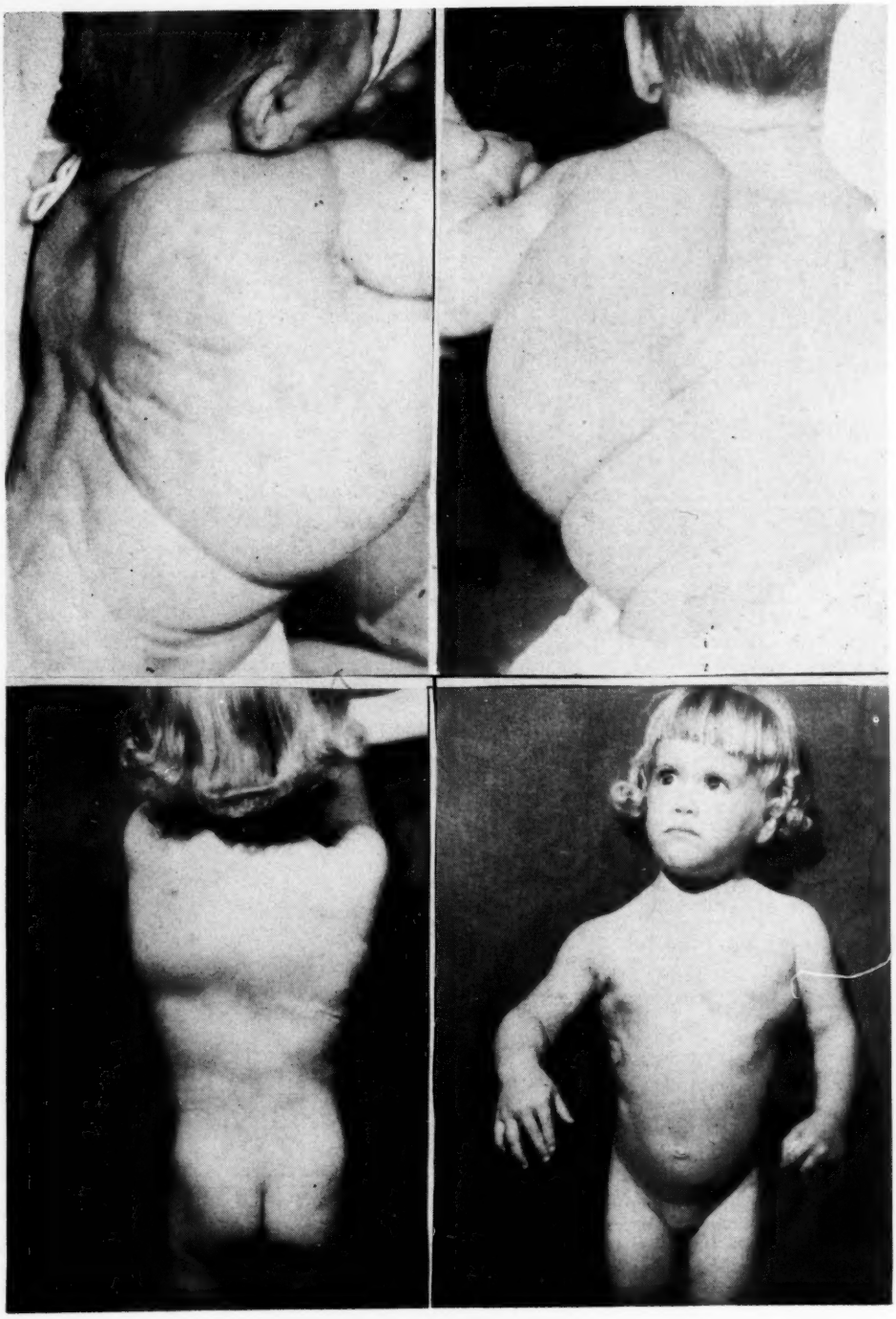

Fig. 17.—*A* and *B*, case of S. B., Dec. 17, 1950, and Nov. 19, 1957, respectively. Six weeks prior to being examined and biopsied by dermatologist, patient had swollen red area on left side of nose, diagnosed by pathologist as reticulum cell sarcoma or lymphoblastoma granuloma. Wide excision was done on Dec. 19, 1950, and reconstruction with lined neck flap. *C* and *D*, case of S. K., Oct. 18, 1953. Infant 4 months of age in whom a lesion on left side of thorax was noted at birth. It increased rapidly in size, and biopsy on Oct. 20, 1953, was reported as cavernous hemangioma. Patient also had arteriovenous communication of left parietal region.

ZUSAMMENFASSUNG

Solange es keine Kriterien gibt, die fortschreitenden angiomatösen Geschwülste von den sich rückbildenden zu unterscheiden, ist es im Interesse des Patienten am besten, die Geschwülste chirurgisch zu entfernen.

Die Resektion sollte beim ersten Erscheinen des Tumors erfolgen und lässt sich dann häufig unter Lokalanästhesie oder ambulant mit kurzer allgemeiner Narkose ausführen.

Der Eingriff ist geringfügig, wenn er frühzeitig erfolgt, und verhütet eine Ausbreitung der Geschwulst.

RIASSUNTO

Fino al giorno in cui non saränno definitivamente stabiliti i criteri differenziali fra la forma aggressiva e quella regressiva dell'angioma, questo tumore deve essere asportato chirurgicamente.

L'escisione chirurgica deve essere esequita non appena esso si sia manifestato; si potrà farla in anestesia locale o con uno leggera anestesia generale.

L'intervento precoce ridurrà ogni rischio ed eviterà lo sviluppo ulteriore della malattia.

RESUMEN

Mientras no haya un criterio formal para diferenciar los angiomas progresivos de los regresivos el tratamiento de mejor pronóstico para la salud del enfermo es la exéresis quirúrgica de los mismo.

La exéresis debe practicarse en cuanto aparezca el tumor, y a menudo puede hacerse con anestesia local o bien gereral superficial si lo desea el enfermo.

La extirpación precoz simplifica las técnicas y previene la extesnión del tumor.

RÉSUMÉ

Jusqu'à l'établissement de critères permettant définitivement de différencier les formes progressives des formes régressives des tumeurs angiomateuses, la meilleure thérapeutique est l'excision chirurgicale dès l'apparition de la tumeur (souvent possible sous anesthésie locale, ou sous une courte anesthésie générale chez les malades ambulatoires).

Une intervention précoce évite l'extension de la tumeur.

REFERENCES

1. Innes, L. F.: Classification of Hemangiomata, Brit. J. Plast, Surg. 6:76, 1953.
2. (a) Andrews, G. C.; Domonkos, A. N., and Post, F. C.: Treatment of Angiomas: Summary of Twenty Years Experience at Columbia Presbyterian Medical Center, Am. J. Roentgenol. 67:273, 1952. (b) Blackfield, H. M.; Torry, T. A.; Morris, W. J., and Low-Beer, V. H.: Visible Hemangiomas, Am. J. Surg. 94:313, 1957. (c) Modlin, J. J.: Capillary Hemangiomas of the Skin, Surgery 38:169, 1955. (d) Wallace, H. J.: The Conservative Treatment of Hemangiomatous Nevi, Brit. J. Plast. Surg. 6:78, 1953. Innis.[1]
3. Stout, A. P.: Tumors of Blood Vessels, Texas State J. Med. 40:362, 1944-1945.
4. Brown, J. B., and Fryer, M. P.: Treatment of Hemangioma, Arch. Surg. 65:417, 1952.
5. Owens, N., and Stephenson, K. L.: Hemangiomas: An Evaluation of Treatment by Injection and Surgery, Plast. & Reconstr. Surg. 3:109, 1948.
6. Johnson, E. W. Jr.; Ghormley, R. K., and Dockerty, M. B.: Hemangiomas of the Extremities, Surg., Gynec. & Obst. 102:531, 1956.
7. Jenkins, H. P., and Delaney, P. A.: Angiomatous Tumors of Skeletal Muscles, Surg., Gynec. & Obst. 55:464. 1932.
8. Bowers, R. E.: Treatment of Hemangiomatous Nevi with Thorium-X, Brit. M. J. 1:121. 1951.
9. Brain, R. T., and Calnan, C. D.: Vascular Nevi and Their Treatment, Brit. J. Dermat. 64:147, 1952.
10. Gross, R. E., and Hurwitt, E.: Cervico-Mediastinal and Mediastinal Cystic Hygroma, Surg., Gynec. & Obst. 88:599, 1945.
11. Briggs, J. D.; Leix, F.; Snyder, W. H., and Chafinn, L.: Cystic Cavernous Lymphangiomas, Western J. Surg. 61:499, 1953.

ADDITIONAL SOURCES

Abdulkerim, A.; Boyd, J. A., and Reeves, R. J.: Treatment of Hemangioma of the Skin in Infancy and Childhood by Roentgen Irradiation and

Radium, Pediatrics 14:523, 1954.

Anderson, C. R.: Treatment of Vascular Nevi, J. Pediat. 25:140, 1944.

Andrews, G. C., and Kelly: Venous Angioma of the Skin Showing Beginning Malignancy, Arch. Derma. & Syph. 26:92, 1932.

Bivings, L.: Spontaneous Regression of Angiomas in Children, J. Pediat. 45:63, 1953.

Blackfield, H. M.; Torry, T. A.; Morris, W. J., and Low-Beer, V. H.: The Management of Hemangiomata, Plast. & Reconstr. Surg. 20:38, 1957.

Brown, J. B., and Byars, L. T.: Interstitial Radiation Treatment of Hemangiomata, Am. J. Surg. 39:452, 1938.

Brown, J. B., and others: Hemangiomas: Treatment and Repair of Defect; Report of Minimal Radiation Dosage of Multiple Suture Procedure, Surg., Gynec. & Obst. 95:33-44, 1952.

Brown, J. B., and Fryer, M. P.: Hemangiomas: Treatment and Repair of Defects, Surg., Gynec. & Obst. 95:33, 1952.

Brown, J. B.; Fryer, M. P., and McDowell, F.: Hemangiomas, Ann. Surg. 137:653. 1953.

Brown, J. B., and Fryer, M. P.: Hemangiomas: Role of Plastic Surgery in Early Treatment for Prevention of Deformities and Repair of Late Lesions and Defects, Plast. & Reconstr. Surg. 11:197, 1953.

Byars, L. T.: The "Malignant" Hemangioma, Surg., Gynec. & Obst. 77:193, 1943.

Conway, H.: Evolution of Treatment of Capillary Hemangiomas of the Face with Further Observations on the Value of Camouflage by Permanent Pigment Injection (Tattooing), Surgery 23:389, 1948.

Costello, M. J.: Management of Vascular Nevi, Pediatrics 4:825, 1949.

Director, S., and Kern, Arthur B.: Reticulum Cell Sarcoma, Arch. Dermat. & Syph. 62:69, 1950.

Figi, F. A.: Treatment of Hemangiomas, Plast. & Reconstr. Surg. 3:1, 1948.

Good, T.: Thrombocytopenia and Giant Hemangioma in Infants, Am. J. Dis. Children 90:260, 1955.

Hendrick, J. W.: Vascular Tumors of the Head and Neck, Am. J. Surg. 84:640, 1952.

Lampe, I.: The Management of Cavernous Hemangiomas in Infants, Postgrad. Med. 19:262, 1956.

Light, R.: Venous Hemangioma of Skeletal Muscle, Ann. Surg. 118:465, 1943.

Matthews, D. N.: Treatment of Hemangiomata, Brit. J. Plast. Surg. 6:83, 1953.

Mills, J.: Hemangiomas and Their Surgical Treatment, Am. J. Surg. 75:80, 1956.

Murray, M., and Stoute, S. P.: The Glomus Tumor: Investigation of its Distribution and Behavior, and the Identity of its "Epitheloid Cells," Am. J. Path. 18:183-203, 1942.

Pack, G. T., and Miller, T. R.: Hemangiomas, Angiology 1:405,1950.

Pemberton, J. de J., and Saint, J. H.: Congenital Arteriovenous Communications, Surg., Gynec. & Obst. 46:470-483, 1928.

Pfahler, G. E.: The Treatment of Hemangioma Chiefly by Irradiation, Arch. Dermat. 72:425, 1955.

Ronchese, F.: Radium in Treatment of Hemangioma, Arch. Dermat. & Syph. 60:717, 1949.

Schwartz, A. R.: Multiple Malignant Hemangioendothelioma in an Infant, S. J. Pediat. 62:1, 1945.

Stout, A. P.: Hemangio-endothelioma: A Tumor of Blood Vessels Featuring Vascular Endothelial Cells, Ann. Surg. 118:445, 1942.

Stout, A. P., and Murray, M. D.: Hemangiopericytoma, Ann. Surg. 116:26, 1942.

Traub, E. F.: Should Vascular Nevi be Treated, Arch. Pediat. 50:272, 1933.

Ward, G. E., and Coving, E. E.: Hemangiomas of the Skin, J.A.M.A. 114:2069, 1940.

Watson, W. L., and McCarthy, W. D.: Blood and Lymph Vessel Tumors: Report of 1,056 Cases, Surg., Gynec. & Obst. 71:569, 1940.

Winner, L. H.: Hemangiomas, Histologic Structure and Treatment. California Med. 77:242, 1952.

The Asclepieion of Cos was for centuries the chief glory of the island. The mind of the ancient Greek associated the word Asclepieion with the island of Cos just as he associated the word Parthenon with Athens. It is said that there were eighty temples to Asclepius in Greece but that those of Epidaurus and of Cos were by far the most famous—famous for their cures. Strabo, the geographer, wrote that "It is said the dietetics practiced by Hippocrates were derived mostly from the cures recorded on the votive tables there."

—*Major*

Induction of Cleft Palate in Mice by Cortisone and Its Reduction by Vitamins

LYNDON A. PEER, M.D., F.A.C.S., F.I.C.S., WALTER H. BRYAN, M.S.,
LYON P. STREAN, PH.D., D.D.S., JOHN C. WALKER, JR., M.D.
W. G. BERNHARD, M.D., AND GEORGE C. PECK, M.D.*

NEWARK, NEW JERSEY

APPEARANCE of the cleft palate deformity within a family is often accompanied by social, psychic and financial problems. Some of these problems may be solved by surgical correction of the deformity and subsequent speech training. Preventive measures administered during pregnancy would provide a more satisfactory end result but have not been available because of the lack of knowledge of the causes of cleft palate.

Recent publications have provided some insight into possible causative agents in the development of this deformity. In a retrospective study of 232 cases of cleft palate there was a high incidence of physiologic, emotional or traumatic stress upon the mother at the time when palate fusion normally occurs.[1] Under stress, stimulation of the adrenal cortex may increase the quantities of cortical hormones in the blood. Since steroids in the serum of pregnant women may reach 400 per cent of the levels in nonpregnant females,[2] additional quantities produced under stress may exceed the threshold levels required to prevent growth of the fetus. The time of stress application would determine the deformity produced, cleft palate appearing if the mother was subjected to stress at the time when the embryonic palate would normally show rapid growth and fusion.

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The demonstration that large doses of cortisone administered to pregnant mice just before normal palate fusion in the embryo will produce a large proportion of cleft palates in the offspring[3] provides an experimental tool with which to test the stress and steroid relation to the cleft palate deformity. Stress in the form of anoxia[4] or deficiencies of certain vitamins[5] may cause cleft palate or other deformities in the offspring of the treated animal.

It has been reported that supplements of a mixture of vitamins in the diet may counteract the cortisone induction of cleft palate in mice.[1] This work is now extended by administration of well-defined doses of individual vitamins concurrently with cortisone treatment of the pregnant mouse.

A relation to the development of cleft palate may be surmised from the publication of case histories in which infants with cleft palates were delivered by mothers who were given cortisone therapy during early pregnancy.[6] A new survey of case histories of this anomaly is in preparation and will be published in the near future.

Methods.—Virgin female Swiss albino mice were mated with males of the same strain. A series of four daily treatments, beginning on the eleventh day after conception, was administered by injection into the thigh muscle. Each group of mice was given one or more of the following treatments:

No treatment

0.1 or 0.2 ml. physiologic solution of

TABLE 1.—*Incidence of Cleft Palate in Offspring of Pregnant Swiss Albino Mice Given No Treatment, 0.1 Ml. of Physiologic Solution of Sodium Chloride or 2.5 Mg. of Cortisone Acetate*

Treatment	No. of Litters	No. of Individual Subjects	No. of Resorptions	No. of Normal Offspring	No. of Offspring with Cleft Palates
None	8	92	0	92	0
Saline solution	12	108	0	108	0
Cortisone	15	136	9	18	109

*All treatments were administered daily on the eleventh to the fourteenth day of gestation, by injection into the thigh muscle.

sodium chloride

2.5 mg. cortisone acetate

10 mcg. riboflavin

10 mcg. pyridoxine hydrochloride (Vitamin B_6)

10 mcg. folic acid.

The treated pregnant female was killed approximately two days before delivery would normally occur, and the embryos were removed from the carcass. The checks were cut, the lower jaw and tongue displaced and the palate examined under a reading glass or a dissecting microscope. A palate was considered fused only if well-developed rugae were present and no cleft, full or partial, was visible. The differences between the normal and the cleft palate have been illustrated by Strean and Peer.[1]

Results. — The report of Baxter and Fraser[3] that cortisone treatment of the pregnant mouse just before the period when normal palate fusion would occur induces the occurrence of cleft palate in newborn mice has been confirmed. The data in Table 1 illustrate this effect. We have never observed a cleft palate in a litter from an untreated or a saline-treated mother. Administration of 2.5 mg. of cortisone daily during the period of treatment produced 109 cleft palates in a total of 127 offspring from the treated mothers.

Protection against the effect of cortisone by vitamins is now confirmed for Vitamin B_6 and folic acid. Vitamin B_2, however, was observed to offer no protection against cortisone. Table 2 lists the effects of vitamins in reducing the incidence of the palatal deformity.

No instances of cleft palate were observed if the mother had received saline solution and either vitamin B_6 or folic acid. Saline solution plus cortisone, however, caused 85 per cent of the offspring to have cleft palates. The incidence of cleft palate was reduced to 43 per cent if vitamin B_6 was substituted for saline solution, and to 26 per cent if folic acid was given in combination with cortisone.

TABLE 2.—*Reduction in Incidence of Cortisone-Induced Cleft Palate by Vitamin B_6 (Pyridoxine Hydrochloride) and by Folic Acid*

Treatment	No. of Litters	No. of Individual Subjects	No. of Resorptions	No. of Normal Offspring	No. of Offspring with Cleft Palates
Saline solution and cortisone	5	49	4	7	38
Saline solution and Vitamin B_6	2	28	0	28	0
Cortisone and Vitamin B_6	5	49	5	25	19
Saline solution and folic acid	7	73	3	70	0
Cortisone and folic acid	9	98	18	59	21
Cortisone, Vitamin B_6 and folic acid	3	21	1	17	3

*Each treatment consisted of two injections of 0.1 milliliter each, and was administered by injection into the thigh muscle daily on the eleventh to the fourteenth day of gestation. The dose of vitamin was 10 Mcg. daily.

If both vitamin B_6 and folic acid were combined with the cortisone treatment, there appeared to be a further reduction to about 15 per cent for cleft palate in the offspring. This requires confirmation, since only 3 litters have been observed.

A few embryos, in addition to the cleft palate deformity, display other abnormalities when the mother is treated with cortisone. About 1 per cent of these embryos have no skull over the brain. Spinal deformities, especially of the tail, may be observed in a few.

The most pronounced tail deformity observed in our laboratory occurred in a male from a litter that was delivered normally. This male had a normal palate and survived to maturity. Mating with his mother and with his female offspring of each succeeding generation has produced 185 individual subjects through the fifth filial generation, none of which had spinal deformities. It appears that the effect of cortisone on skeletal development probably is not transmitted through the genetic apparatus to succeeding generations.

Application of stress in the form of noise; air jets; violent mechanical agitation, or injection with hematoporphyrin, a light-sensitive pigment, followed by exposure to strong light, has failed to produce any evidence of gross congenital abormalities in mice. One litter from a mother who was given 10 units of adrenocorticotrophic hormone preparation on the eleventh day of gestation consisted of 8 offspring, 1 of whom had a tail deformity. This is the first experimental evidence we have obtained with mice of the production of abnormalities by the action of pituitary secretions.

COMMENT

The many effects of cortisone upon the experimental animal indicate that some basic process necessary for the health of the individual cell, and of the organism as a whole, is affected by this hormone. There are reports in the literature of a disturbance in the nitrogen balance of the animal[6b] and of the "depolymerization" of the ribonucleic acids of liver mitochondria and microsomes[7] upon treatment of the animal with cortisone. The disturbance of the nitrogen balance may be due to interference with the functions of vitamin B_6, which is a coenzyme in the metabolism of amino acids. A stimulation of liver transaminase activities has been observed when rats were treated with cortisone.[8] Acceleration of specific transaminase activities may cause a more rapid synthesis of certain amino acids at the expense of others, thus altering the proportions of the various amino acids available for protein synthesis. This may result in an interference with protein metabolism, which in turn would interfere with growth in the embryo, producing congenital abnormalities.

"Depolymerization" of nucleic acids may reflect a decrease in synthesis of these substances while degradative enzymes retain their activities. A reduced rate of production of nucleic acids may occur as a result of interference by cortisone with the functions of folic acid, which participates in the synthesis of the purine and pyrimidine components of nucleic acids.[9] Alternatively, the functions of this vitamin in the biosynthesis of serine,[10] and possibly in the formation of methionine[11] and creatine,[12] may be the critical reactions with which cortisone interferes.

Inhibition by cortisone of the functions of vitamin B_6 and folic acid may therefore limit the production of nucleic acids and of proteins in the embryo and prevent growth for a short time after administration of the hormone. Treatment during the period of rapid growth and fusion of the palatal processes would thus prevent

this fusion, resulting in a congenital cleft palate.

It is probable that cortisone interferes with the metabolic functions of vitamin B_6 and folic acid, stimulates degradative processes that nullify the effects of these vitamins, or stimulates the metabolic alteration of the vitamins to forms that are inactive. The result of this interference is a retardation of the net rate of synthesis of substances, probably proteins and nucleic acids, which are necessary for the growth of the embryo. If the hormone is administered to the mother at the time critical for palate development, the gross result observed is the delivery of a high percentage of offspring with cleft palates.

SUMMARY

In a study of the causes of cleft palate, the authors obtained results that confirm those obtained by Baxter and Fraser, namely, that cortisone treatment of the pregnant mouse just before the period when normal fusion of the palate would take place induces cleft palate in the newborn mouse. Administration of 2.5 mg. of cortisone daily during the period of treatment produced 109 cleft palates in a total of 127 offspring. in control groups left untreated or treated with injections of saline solution, no cleft palates were encountered. Saline solution plus cortisone, however, caused 85 per cent of the offspring to have cleft palates. The incidence of cleft palate was reduced to 43 per cent when Vitamin B_6 was substituted for saline solution and to 26 per cent when folic acid was given in combination with cortisone. When both Vitamin B_6 and folic acid were combined with cortisone, there was apparently a further reduction to 15 per cent; this, however, requires confirmation, since only 3 litters have been observed.

RIASSUNTO

Nello studio sulla patogenesi della paltoschisi gli autori sono giunti alle stesse conclusioni di Baxter e Fraser, che cioè il trattamento cortisonico della topina gravida, iniziato prima che avvenga la normale fusione del palato, induce la palatoschisi nel neonato. La somministrazione di mg. 2,5 di cortisone al giorno produsse questo risultato in 109 su 127 casi, mentre in un gruppo di controllo non si ebbe alcuna anomalia del palato. Il trattamento con cortisone piu soluzione fisiologica diede l'85% di risultati positivi, mentre la frequenza della paltoschisi discese al 43% quando si usò la vitamina B6 al posto della soluzione fisiologica e al 26% quando si usò la vitamina B12; l'impiego cotemporaneo della vitamina B6 e dell'acido folico, in aggiunta al cortisone, determinò un'ulteriore abbassamento della frequenza (15%). Questo ultimo dato deve ricevere conferma.

RESUMEN

En un estudio sobre las causas de la fisura del paladar los autores han obtenido resultados que confirman los de Baxter y Fraser, es decir, que el tratamiento con cortisona de la ratona en su gestación justamente antes del período en que normalmente tiene lugar la fusión del paladar determina la aparición de la fisura palatina en el ratón hijo. La administración de 2'5 mg. de cortisona diariamente durante el período de tratamiento dió lugar a 109 fisuras palatinas en un total de 127 ratones nacidos. En cambio, en grupos de control no tratados o sometidos a inyecciones de solución salina no aparecieron casos de fisuras palatinas. No obstante la administración de solución salina más cortisona determinó la aparición de paladar hendido en un 85% de los casos. Ahora bien la presencia de la fisura palatina se

redujo a un 43% cuando la solución salina fué sustituída por Vitamina B6 y a un 26% cuando se dió ácido fólico en combinación con la cortisona. Y, más aún, cuando ambos, Vitamina B6 y ácido fólico se combinaron con la cortisona la aparición de la deformidad se redujo a un 15%, aunque esto no signifique mucho sin una confirmación, ya que solo han sido estudiadas tres camadas de ratones.

RÉSUMÉ

Une étude personnelle des auteurs sur la fissure du palais confirme les résultats décrits par Baxter et Fraser: un traitement à la cortisone chez la souris enceinte, immédiatement avant la période à laquelle s'accomplit la soudure physiologique du palais, provoque une fissure du palais chez la souris nouveau-née. L'administration quotidienne de 2,5 mg de cortisone a provoqué 109 cas de fissures du palais sur une nichée de 127 souris. Aucune fissure du palais n'a été constatée dans les groupes de contrôle non traités ou traités au moyen d'injections de solutions salines, alors que la cortisone additionnée aux solutions salines a causé 85% de fissures du palais. Cette incidence a été réduite à 43% avec l'utilisation de vitamine B6 en remplacement de la solution saline, et à 26% avec l'administration d'acide folique en combinaison avec la cortisone. La combinaison de vitamine B6 et d'acide folique avec la cortisone a, semble-t-il, provoqué une diminution additionnelle de 15%; mais ce fait demande à être vérifié car il n'a été contrôlé que sur trois nichées.

ZUSAMMENFASSUNG

Die Untersuchungen der Verfasser führen zu den gleichen Ergebnissen, die Baxter und Fraser erzielten, nämlich dass die Cortisonbehandlung der schwangeren Maus kurz vor dem Zeitpunkt der normalen Verschmelzung des Gaumens zur Entstehung eines Wolfsrachens bei der neugeborenen Maus führt. Unter 127 Mäusen kam es in 109 Fällen zur Entstehung eines Wolfsrachens nach täglicher Verabreichung von 2.5 mg Cortison. Bei der Kontrollgruppe, die entweder mit Einspritzungen von Kochsalzlösung oder überhaupt nicht behandelt wurde, kamen keine Wolfsrachen vor. Die Verabfolgung von Kochsalzlösung und Cortison jedoch führte in 85% der Neugeborenen zur Wolfsrachenbildung. Wenn die Kochsalzlösung durch Vitamin B6 ersetzt wurde, sank die Häufigkeit der Wolfsrachenbildung auf 43% und, wenn eine Kombination von Folinsäure und Cortison verabreicht wurde, auf 26%. Die gleichzeitige Verabreichung von Vitamin B6, Folinsäure und Cortison scheint zu einem weiteren Absinken der Häufigkeit auf 15% zu führen. Diese Beobachtung bedarf jedoch weiterer Bestätigung, da nur drei Würfe unter diesen Bedingungen untersucht wurden.

REFERENCES

1. Strean, L. P., and Peer, L. A.: Stress as an Etiologic Factor in the Development of Cleft Palate, Plastic & Reconstr. Surg. 18:1-8, 1956.

2. Robinson, H. J.; Bernhard, W. G.; Grubin, H.; Wanner; Semekow, G. W., and Silber, R. H.: 17. 21-dihydroxy-20-ketosteroids in plasma during and after pregnancy. J. Clin. Endocrinol. Metab. 15:317-323, 1955.

3. Baxter, H. and F., Fraser, G.: Production of congenital defects in offspring of female mice treated with cortisone. McGill Med. Jour. 19:245-249, 1950.

4. Ingalls, T. H.; Curley, F. J., and Prindle, R. A.: Anoxia as a Cause of Fetal Death and Congenital Defect in the Mouse, Am. J. Dis. Child. 80:34 45, 1950.

5. Evans, H. M.; Nelson, M. M., and Asling, C. W.: Multiple Congenital Abnormalities Resulting from the Acute Folic Acid Deficiency During Gestation, Science 114:479, 1951. Hogan, A. G.; O'Dell, B. L., and Whitley, J. R.: Maternal Nutrition and Hydrocephalus in Newborn Rats, Proc. Soc. Exp. Biol. & Med. 74:293-296, 1950. Warkany, J.: Congenital Malformations Induced by Maternal Nutritional Deficiency, J. Pediat. 25:476, 1944.

6. Harris, J. W. S., and Ross, I. P.: Cortisone Therapy in Early Pregnancy: Relation to Cleft Palate, Lancet 1:1045-1047, 1956. Doig, R. K., and Coltman, O. McK.: Cleft Palate Following Cortisone Therapy in Early Pregnancy, Lancet 2:730, 1956.

7. Greenberg, G. R.: Role of Folic Acid in Purine Biosynthesis, Fed. Proc. 13:745-749, 1954.

8. Brin, M., and McKee: Effects of X-Irradiation. Nitrogen Mustard, Fasting, Cortisone, and Adrenalectomy on Transaminase Activity in the Rat, Arch. Biochem. Biophys. 61:384-389, 1956.

9. Friedkin, M., and Roberts DeW.: Conversion of Uracil Deoxyriboside to Thymidine of Deoxyribonucleic Acid, J. Biol. Chem. 220:653 660, Greenberg.[7]

10. Alexander, N., and Greenberg: Studies on the Purification and Properties of the Serine-Forming Enzyme System, J. Biol. Chem. 220:775-785.

11. Doctor, V. M.; Patton, T. L., and Awapara, J.: Incorporation of Serine-3-C^{14} and Formaldehyde-C^{14} into Methionine *in Vitro:* I. Role of Folic Acid, Arch. Biochem. Biophys. 67:404-409.

12. Fatterpaker, P.; Marfatia, U., and Sreenivasan, A.: Role of Folic Acid and Vitamin B_{12} in Transmethylations: I. Formation of Creatine *in Vitro* and *in Vivo,* Indian J. Med. Research 43:43-50, 1956.

The earliest authentic case of blood transfusion was performed on Pope Innocent VII in 1492. His Jewish physician drew the blood from three young boys and transfused it into the veins of the aged Pope. The three boys died as a result of the procedure, and the prelate derived no benefit from it.

The prostate gland was first described by Niccolo Massa, a physician and anatomist of Venice, in 1536.

False teeth fastened to adjoining teeth were fashioned in very early times. It was not until 1758 that Lorenz Heister, a German surgeon, made a complete denture.

Jean Louis Petit, the leading French surgeon of the eighteenth century, was the first to open the mastoid process, in a case of middle ear disease, in 1736. Petit was also the inventor of the screw-tourniquet.

John Stough Bobbs (1809-70), an American surgeon, performed the first cholecystomy for gallstones in 1868.

Theodore Kocher (1841-1917), of Bern, was the first to undertake thyroidectomy for goiter, in 1878. He performed this operation over 2,000 times, with a mortality rate of 4.5 percent.

Artificial pneumothorax for pulmonary tuberculosis was suggested by James Carson in 1842 but was first carried out by an Italian, Carlo Forlanini, in 1895. It was introduced into America by the famous Chicago surgeon, J. B. Murphy.

The first ambulance service was inaugurated by Baron Larrey, Surgeon-in-Chief to the Napoleonic armies.

—Hamilton Bailey, F.R.C.S. (Eng.), F.A.C.S. F.R.C.S. (Edin.), F.I.C.S. (Hon.)

The Conservative Treatment of Hemangiomas in Infants and Children

HARRY M. BLACKFIELD, M.D., F.A.C.S., F.I.C.S.,
FRANCES A. TORREY, M.D., WILLIAM J. MORRIS, M.D.,
AND BERTRAM V. A. LOW BEER, M.D.

SAN FRANCISCO, CALIFORNIA

SPONTANEOUS involution of hemangiomas of infancy and childhood was reported in the medical literature as early as 1888.[1] Nevertheless, it was not until Lister's paper appeared in 1938,[2] in which he reported a clinical study on 97 children with involuting hemangiomas, that adequate notice was taken of this fact. In recent years more and more authors have reported studies confirming Lister's observations.[3]

In two previous articles[4] we have reviewed the literature and described some of the results of a study on visible hemangiomas that has been going on at the University of California Medical Center in San Francisco since 1949. This study is of interest in that it is a group project in which the departments of dermatology, radiology and surgery participated. As this study already includes more than 700 cases, many of multiple hemangiomas, some aspects are worthy of repetition.

During the first four years of the study, all recognized methods of therapy were used. No radical method that might damage normal tissue was carried out, since we were convinced that, essentially, all hemangiomas are benign growths. At the same time, we allowed a small number of patients to go untreated. We wished to verify the occurrence of spontaneous involution and to observe its various stages.

After four years we became convinced that spontaneous involution does occur (P. S., Case 1). We were also struck by the fact that the lesions undergoing treatment were involuting in the same manner as the untreated ones, thereby casting doubt upon the effectiveness of our methods of treatment. Since that time we have stopped early treatment in all cases of the involuting type of hemangioma, which made up an overwhelming percentage of the hemangiomas of infants and children in our series.

As a result of our study, we have devised the following classification to differentiate between the involuting and the noninvoluting type of hemangioma:

1. Involuting (infants)
   a. Superficial
   b. Combined (superficial and deep)
   c. Deep
2. Noninvoluting (adults)
   a. Port wine stain (naevus flammeus)
      1. Without subsequent growth
      2. With subsequent growth
   b. True cavernous
      1. Without subsequent growth
      2. With subsequent growth (puberty, pregnancy)
   c. Venous racemose aneurysms and arteriovenous fistulas

From the Departments of Surgery, Dermatology and Radiology, University of California Medical Center, and the Plastic Surgery Service of the Franklin Hospital, San Francisco.
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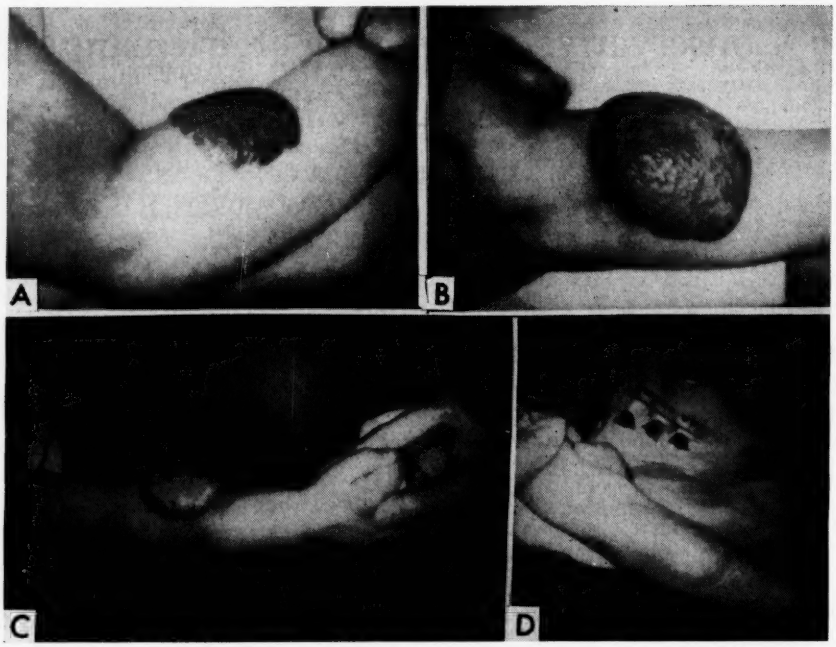
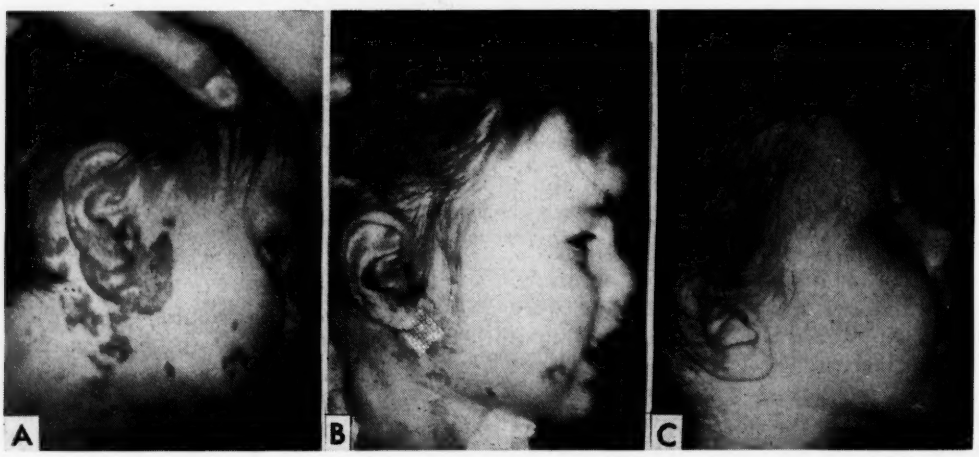


CASE 1.—Photographs of P. S., who was not treated. *A*, appearance at age of 6 weeks. *B*, rapid growth of lesion in three months. *C*, appearance a year later. Involution is well on its way. *D*, appearance at age of 3 years. Involution is essentially complete, with residual vaccination-like scarring.



CASE 2.—Photographs of K. M., who was not treated. *A*, cessation of growth at 6 months. *B*, appearance a year later; involution is proceeding in both the large lesion and the satellites. *C*, three years later. All lesions have disappeared.

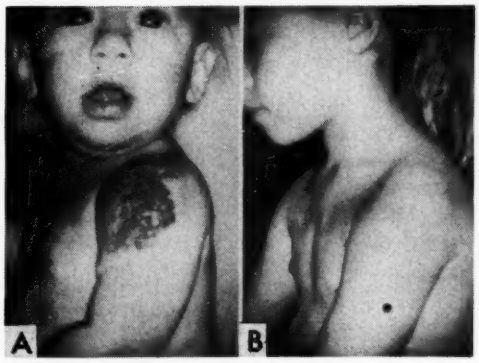
d. Diffuse hemangiomatosis
   1. With gigantism
e. Spider angioma
f. Angiofibroma
g. Diffuse telangiectasia
h. Malignant (rare)

1. Hemangioendothelioma
2. Hemangiopericytoma

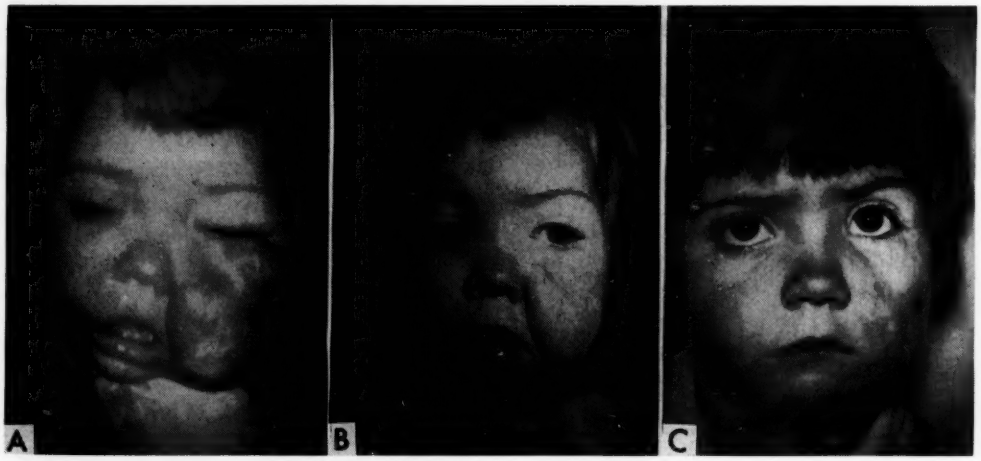
Included in the involuting group are the lesions that appear at birth or soon after. They may present superficial (P. S., Case 1, and K. M., Case 2) or deep elements, or show a combined picture (J. H., Case 3).

Shortly after their appearance a period of rapid growth ensues, which may last for three to nine months. The tumor may expand to frightening proportions during the period of growth, after which involution occurs. With small superficial lesions, involution may be complete in a year or two, with disappearance of the lesion. The larger tumors may still show a wrinkling or bagginess of the skin and soft tissues after four or five years, at which time surgical revision is usually indicated (M. C., Case 4).

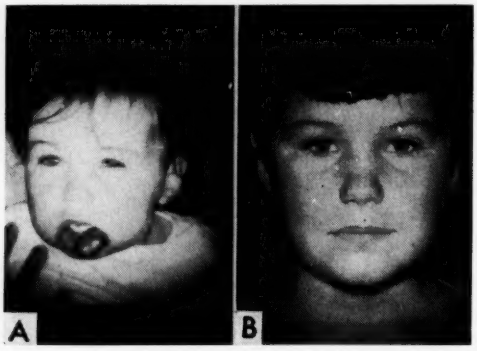
It is also obvious that not all of the hemangiomas observed in infants and children are of the involuting type. The noninvoluting types require treatment whenever practical. From our observations, most methods of treatment for the port wine stain (naevus flammeus) give results which, unfortunately, leave a great deal to be desired. Irradiation of sufficient degree to cause disappearance of the vascular elements will cause permanent tissue changes. Carbon dioxide snow also damages normal tissue, resulting in surface scarring. Tattooing has been valuable in some cases but disappointing in others.



CASE 3.—Photographs of J. H., who was not treated. *A*, superficial and deep elements present at the age of 9 months. *B*, involution complete at the age of 6 years.



CASE 4.—Photographs of M. C., who underwent early treatment with carbon dioxide and injection of sclerosing solutions of questionable value. *A*, appearance of tumor at the age of 15 months. *B*, sagging residual tissues at the age of 4 years. *C*, appearance one month after partial excision of residual tissue.



CASE 5.—Photographs of M. W., who underwent partial excision at the age of 1 and 5 years respectively. *A*, lesion before partial excision at age of 1 year. *B*, result one year after last excision.

Excision and shifting in of adjacent whole thickness skin and subcutaneous tissue gives excellent results in selected cases. When such features as the eyelids and the angle of the mouth are distorted from the normal, however, the resulting deformity can be more pronounced than the original hemangioma. Camouflage with various types of make-up is frequently the best solution of the problem.

Port wine stains that undergo thickening and nodular growth in adult life require surgical excision. Closure of the defect is carried out by shifting in adjacent tissues or skin grafting.

True cavernous lesions may be small or quite large and deforming. They usually grow slowly, however, during infancy and childhood. They may also show accelerated growth at puberty or during pregnancy. Surgical excision, whenever possible, is the procedure of choice. Injections of sclerosing solution may be valuable in selected cases.

Venous racemose aneurysms, arteriovenous fistulas and diffuse hemangiomatosis may present almost insurmountable therapeutic problems. Although few patients are cured, some benefit can be obtained by surgical treatment in selected cases.

Angiofibromas should be excised for the best cosmetic result. Spider angiomas can usually be eradicated by central vein cauterization.

Diffuse telangectasia is not usually benefited by local therapy. Treatment of associated disorders, such as cirrhosis, may result in pronounced improvement.

The rare malignant lesions (none of which have been encountered in this series) are treated as are other malignant neoplasms.

SUMMARY

Spontaneous involution of the most common hemangiomas of infancy and childhood must be accepted as a fact. In some cases, however, involution progresses

CASE 6.—Photographs of D. D., who had a large ulcerated lesion of the upper lip and nose, present at birth. *A* and *B*, preoperative condition. *C* and *D*, result after two operative procedures at the age of 1 and 12 years respectively.

slowly, while in a small percentage regression does not occur.

A practical classification of hemangiomas is presented.

When surgical intervention is forced by parental pressure and is attempted during the growing phase of the large involuting type of hemangioma, the tumor can rarely be completely excised, and growth will continue in the residual vascular tissue until the latent period is reached. If operation is delayed until involution has started, one may perform a more conservative excision, as the residual vascular tissue will involute spontaneously (M. W., Case 5, and D. D., Case 6). If early therapy is required to placate the parents, some homeopathic method of treatment at infrequent intervals should be carried out.

It is also recognized that plastic surgical measures are necessary to remove the residual disfigurements of the large hemangioma. Such procedures, however, when performed a number of years after the involution of a large hemangioma, are much simpler and less dangerous than when attempted in infancy.

Radical methods of treatment that may damage or prevent the growth of normal tissues are contraindicated.

Treatment for the noninvoluting types of hemangioma is discussed.

RESUMEN

En la mayor parte de los hemangiomas simples de la infancia la involución espontánea debe ser aceptada como un hecho. En algunos casos esta involución progresa muy lentamente y en an pequeño poreentaje no se produce en absoluto.

Se expone en este trabajo una clarificación práctica de los hemangiomas. Cuando forzados por la insistencia de los padres se lleva a cabo una intervención quirúrgica durante la fase de crecimiento de estos tumores involutivos, el tumor raramente es extirpado por completo y continúa creciendo a expensas del tejido vascular residual hasta que llega el período latente. Si la operación se retrasa hasta el comienzo de la fase involutiva se puede practicar una excisión más conservadora ya que el tejido vascular residual ha de involucionar expontaneamente. Si para calmar la impaciencia de los padres se precisa una terapéutica precoz, se puede usar algún método homeopático a intervalos poco frecuentes.

Tambien se reconoce la necesidad de medidas quirúrgicas plásticas para hacer desaparecer las deformidades residuales de los grandes hemangiomas.

Sin embargo, tales procederes son más sencillos cuando ha pasado ya un número de años de la involución que cuando se practican en la infancia.

Los métodos radicales de tratamiento que pueden perjudicar o impedir el crecimiento normal de los tejidos están contraindicados.

También se estudia el tratamiento de los hemangiomas no involutivos.

RÉSUMÉ

L'involution spontanée des hémangiomes les plus communs de la première enfance et de l'enfance doit être admise comme un fait dans la plupart des cas.

Une classification pratique des hémangiomes est présentée.

Lorsqu'une intervention chirurgicale est indiquée par suite de l'existence d'une pression parentale durant la phase de croissance d'un type d'hémangiome à forte involution, une extirpation totale est rarement pratiquable et la tumeur continuera à se développer dans le tissu vasculaire résiduel jusqu'à ce que la période de latence soit atteinte. Si l'opération est retardée jusqu'au début de la période d'involution, une excision plus conservatrice

est possible étant donné que le tissu vasculaire résiduel subira une involution spontanée (cas 5 et 6).

Si une thérapeutique précoce est nécessaire afin de renforcer les parois, un traitement homéopathique à intervalles éloignés est indiqué.

La nécessité de recourir à la chirurgie plastique est reconnue pour la réparation des déformations causées par les grands hémangiomes.

Une plastie présente moins de dangers et est d'une exécution plus simple si elle est pratiquée quelques années après l'involution d'un grand hémangiome.

Les techniques radicales pouvant léser les tissus sains ou compromettre leur croissance sont contre-indiquées.

Le traitement des types d'hémangiomes non-involutifs est discuté.

RIASSUNTO

Molti degli emangiomi dell'infanzia e della giovinezza anno incontro ad una spontanea involuzione. In qualche caso, tuttavia, tale processo involutivo procede molto lentamente e talora non avviene affatto.

Viene presentata una classificazione pratica degli emangiomi. Quando l'intervento chirurgico sia divenuto necessario, e venga eseguito nella fase di crescita del tumore, questo raramente può essere asportato completamente, sicchè i tessuti angiomatosi residui continueranno a svilupparsi. Quando, invece, l'intervento avrà potututo essere differito fino al momento in cui il tumore ha iniziato la sua involuzione, sarà possibile eseguire un'exeresi più limitata poichè le parti residue regrediranno spontaneamente. Si potrà inoltre ricorrere anche a qualche trattamento omeopatico a frequenti intervalli qualora sia necessario tranquillizzare i genitori del malato.

Interventi plastici dovranno farsi per correggere le deturpazioni consecutive agli emangiomi di grandi dimensioni.

Tutto ciò, naturalmente, diviene molto più facile e più sicuro quando lo si faccia molti anni dopo l'involuzione spontanea.

Devono essere proscritti tutti quei metodi di cura che possano compromettere lo sviluppo dei tessuti normali.

ZUSAMMENFASSUNG

Das die meisten gewöhnlichen Hämangiome des Säuglings- und Kindesalters sich spontan zurückbilden, muss als Tatsache anerkannt werden. In manchen Fällen jedoch erfolgt die Rückbildung langsam und in einen geringen Prozentsatz überhaupt nicht.

Die Arbeit enthält eine praktische Einteilung der Hämangiome. Wenn ein chirurgischer Eingriff durch das Drängen der Eltern des Kindes erzwungen wird und im Stadium des Wachstums eines grossen Hämangioms von regressivem Typus erfolgt, kann die Geschwulst nur selten vollständig reseziert werden und wird im zurückgelassenen vaskulären Gewebe weiterwachsen, bis sie das Latenzstadium erreicht hat. Wird die Operation bis zum Einsetzen der Rückbildung hinausgeschoben, so kann man eine mehr konservative Resektion ausführen, weil sich das zurückbleibende Gefässgewebe spontan zurückbilden wird (Fall 5, Fall 6).

Wenn zur Beruhigung der Eltern frühzeitige Behandlung erwünscht ist, sollten irgendwelche homöopathischen Massnahmen in grösseren Zeitabständen durchgeführt werden.

Es wird anerkannt, dass plastisch-chirurgische Massnahmen zur Beseitigung der zurückbleibenden durch ein grosses Hämangiom verursachten Entstellungen notwendig sind. Diese Verfahren lassen sich jedoch nach einer Reihe von Jahren nach der Involution eines grossen Hämangioms viel einfacher und gefahrloser ausführen als im frühen Kindesalter.

Radikale Behandlungsmethoden, die das Wachstum normalen Gewebes schädigen oder verhindern können, sind kontraindiziert.

Die Behandlung der sich nicht zurückbildenden Formen des Hämangioms wird erörtert.

REFERENCES

1. Duncan, J.: On the Value of Electrolysis in Angioma and Goiter, Brit. M. J. 11:984, 1888.

2. Lister, W. A.: Natural History of Strawberry Nevi, Lancet 1:1429, 1938.

3. Hopkins, J. G.: Vascular Nevus with Spontaneous Involution, Arch. Dermat. & Syph. 43:1033, 1951. Bivings, L.: Spontaneous Regression of Angiomas in Children, J. Pediat. 45:643, 1953. Brown, J. B., and Fryer, M. P.: Hemangiomas: Role of Plastic Surgery in Early Treatment for Prevention of Deformities in the Repair of Late Lesions and Defects, Plast. & Reconstr. Surg. 11:197, 1953. Walter, J.: On the Treatment of Cavernous Hemangioma, with Special Reference to Spontaneous Regression, J. Fac. Radiol. 5:134, 1953. Wallace, H. J.: The Conservative Treatment of Hemangiomatous Nevi, Brit. J. Plast. Surg. 6:78, 1953. Van der Werf, E.: Spontaneous Disappearance of Hemangiomata, Nederl. Tijdschr. Geneesk 6:78, 1953. Ronchese, F.: The Spontaneous Involution of Cutaneous Vascular Tumors, Am. J. Surg. 86:376, 1953. Modlin, J. J.: Capillary Hemangiomas of the Skin, Surgery 38:169, 1955. Lampe, I.: The Management of Cavernous Hemangiomas in Infants, Postgrad. Med. 19:262, 1956. Ronchese, F.: Hemangiomas: Should Treatment be Expectant or Active? Rhode Island M. J. 29:658, 1956. Jacobs, A. H.: Strawberry Hemangiomas: The Natural History of the Untreated Lesion, California Med. 86:8, 1957.

4. Blackfield, H. M.; Torrey, F. A.; Morris, W. J., and Low-Beer, V. A.: The Management of Hemangiomata, Plast. & Reconstr. Surg. 20, 1957. The Management of Visible Hemangiomas, Am. J. Surg. 94, 1957.

Wound infection with its dreadful sequels, erysipelas, gangrene and blood poisoning, was in those days (middle of eighteenth century) rampant on surgical wards. A fracture of an arm or a leg in which the muscles and skin had been torn, or the amputation of an extremity, terminated appallingly often in death. "The man laid on an operating table in one of our surgical hospitals," wrote the famous obstetrician Sir James Simpson, "is faced by more chances of death than the English soldier on the field of Waterloo."

The cause of wound infection was seen in some property of the air, in some miasma stemming from the patients with gangrene and erysipelas. But the surgeons saw no way to combat these conditions, and Lister had no clearer concept than anyone else.

His great inspiration came when, in 1865, he became acquainted with the brilliant researches in which Louis Pasteur had shown that fermentation and putrefaction were caused by micro-organisms. Were micro-organisms possibly also the cause of "hospital gangrene"? Was there any chemical which would destroy them after they had invaded a wound. Carbolic acid . . . might be such an agent!

—*Farmer*

Repair of Perineal Radiation Necrosis with a Scrotal Flap

MAX W. PEGRAM, M.D., F.A.C.S., D.A.B.

AND

JOSEPH L. HANNON, M.D.

BEVERLY HILLS, CALIFORNIA

NECROSIS and ulceration of skin and underlying tissues can be caused by intense irradiation. The radiation has ordinarily been given months or years before the actual ulceration appears.

The chronic irradiated area prior to ulceration is covered with a thin atrophic epithelium that is easily traumatized. If trauma occurs and a break of the overlying epithelium results, a portal of entry for bacteria is established. Infection often ensues, since there is little resistance to the bacteria by the previously damaged cells and the blood supply to the area is severely impaired. The inflammatory process combined with the impaired blood supply results in necrosis. The reparative process is deficient, which is also due to the decreased blood supply.

In cases of acute ulceration due to irradiation the necrosis of skin and underlying tissues at first appears as an avascular, adherent slough that finally separates from the underlying viable tissue, leaving an ulceration covered by a thick tenacious exudate that is difficult to remove. Necrotic, avascular fibrous septums extend deep into the base of the ulceration. The edges of the ulcer are usually undermined, and there is brownish discoloration of the surrounding skin, with induration and loss of epidermal appendages. There is a pronounced inflammatory reaction surrounding the area of necrosis. Microscopically there are an increase of collagenous tissue in the corium and an obliterative phenomenon in the walls of the blood vessels that causes narrowing and often complete obliteration of their lumens, and atrophy of the epidermis.

When the necrotic defect is extensive, complete excision to a viable base is mandatory. Occasionally secondary healing will occur after adequate excision of the involved area; frequently, however, skin grafts or pedicle flaps must be utilized.

Extirpation of the dead tissues often necessitates much deeper and wider excision than one would expect. When adequate excision of the radiation ulcer would involve exposing an important underlying structure, such as peritoneum, pleura or vessels of the neck, a pedicle flap for coverage would appear to be required. Early coverage is sometimes necessary to prevent the possibility that important underlying structures may become necrotic. A pedicle flap that carries its own blood supply is preferable, since a certain amount of revascularization will result and aid in the healing of the underlying structures involved. A pedicle flap based at a distance from the radiated area, however, is much safer, since the tissues in the immediate neighborhood of the necrotic area are often involved in obliterative vascular changes caused by the irradiation, which would limit the blood supply in the base of the pedicle.

Read at the Twenty-Third Annual Congress of the United States and Canadian Sections, held in conjunction with the Eleventh Biennial International Congress, International College of Surgeons, Los Angeles, March 9-14, 1958.

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This paper is presented in order to show the management of a rather unusual radiation ulcer by adherence to the criteria set forth in the foregoing paragraphs, which can be enumerated as follows:

1. When excision of the defects involves exposure of an important structure, a pedicle flap is desirable.

2. A pedicle flap carrying its own blood supply is preferable.

3. The pedicle flap should not be based adjacent to the ulceration, since the blood vessels in the base of the pedicle will probably be involved in the obliterative phenomenon and thus jeopardize the viability of the flap.

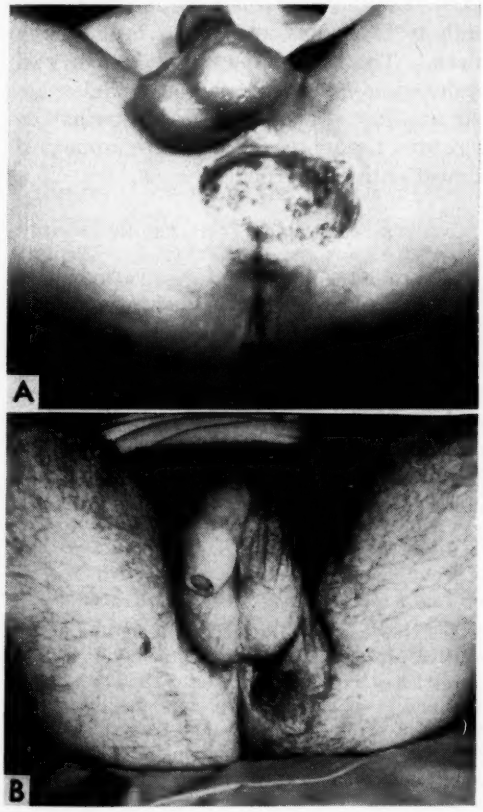

Fig. 1.—Preoperative (*A*) and postoperative (*B*) photographs taken in case here presented.

In the case to be described (Fig. 1), radiation necrosis of the perineum resulted from the treatment of a carcinoma of the anus by roentgen irradiation. It is not the purpose of this paper to consider the merits of the treatment employed for the original anal carcinoma. The problem for the plastic surgeon, in this case, was presented after the original treatment and involved repair of the perineal defect.

The patient had received 5,016 roentgen units to the perineal region over a period of twenty-nine days. This was followed by necrosis and ulceration, which became progressively more extensive. A colostomy had been performed because of intense pain on defecation and to prevent contamination of the area. The posterior portion of the urethra was central in the depth of the ulceration, separated from the surface of the ulcer only by its wall. It was feared that the wall of the urethra would become necrotic and form a fistula that would be difficult to close. It was considered impossible to excise the ulcerated area and obtain a base sufficiently healthy to insure the survival of a split skin graft without entering the posterior portion of the urethra. The use of a pedicle flap carrying its own blood supply was considered the treatment of choice.

A pedicle flap based in the area adjacent to the ulceration was not considered, since its base would be involved in the obliterative vascular process and its blood supply would not be adequate for viability. A pedicle flap based at a distance from the ulceration, therefore, was considered necessary; this was obtained by utilizing the posterior scrotal surface.

The edges of the ulcer were excised to freshly bleeding edges. The thick, tenacious fibrinous exudate was removed from the base of the ulcer as well as possible. The intervening bridge of tissue between the anterior edge of the ulcer and the scrotum was excised. A posterior scrotal flap (Fig. 2)

was then outlined, based upon the inferior portion of the scrotum to the scrotal reflection posteriorly. The two lateral incisions were then joined by an incision extending along the perineal-scrotal reflection. The incisions were deepened through subcutaneous tissue and dartos fascia, and the entire flap was elevated. The posterior scrotal flap thus created had adequate bleeding from the cut edges. The tip of the flap was divided into two portions, so that the edges could be sutured along the posterior edge of the ulcer and around the anterior edge of the anus. The sides of the flap were sutured into the sides of the ulcer. A pressure stent dressing was molded into the ulcer defect covered by the flap, thus maintaining the testicles in an advanced upward position beneath the anterior scrotal skin and away from the ulcer. The flap remained viable and healed both to the edges and to the base of the ulcer. The remaining scrotal skin and underlying layers about the testicles became adjusted, and after six months the scrotum, though reduced in size, appeared almost entirely normal.

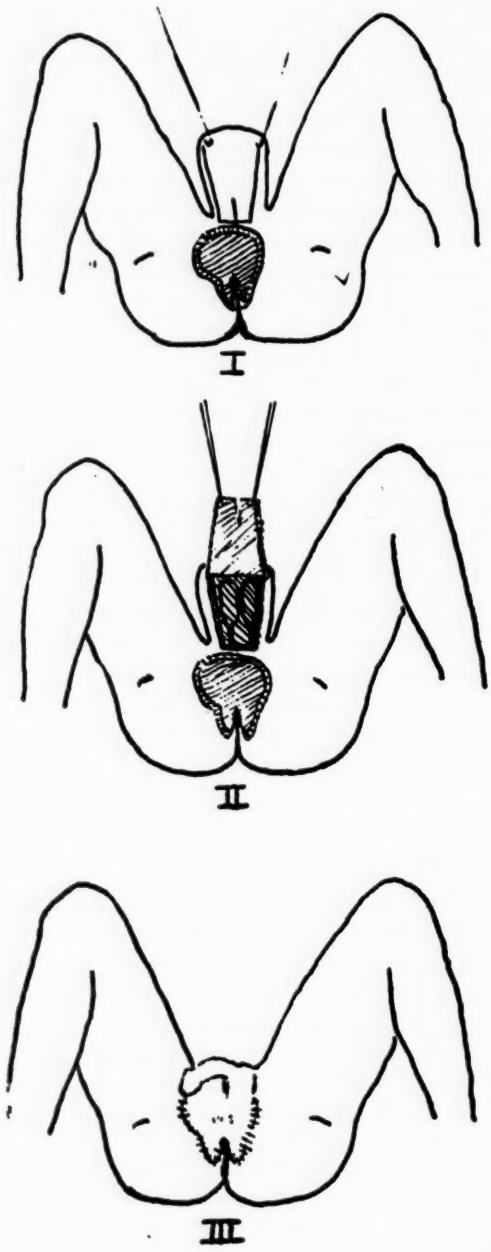

Fig. 2 (*opposite*).—Diagrammatic outline of operative procedure. *I*, edges of the ulcer incised. Scrotal flap outlined on posterior surface of scrotum and based on inferior portion of scrotum. *II*, posterior scrotal flap elevated from underlying testicles and an incision made in tip of flap in its longitudinal axis, so that flap can be sutured around anus. *III*, scrotal flap sutured in position. Testicles are left in position beneath anterior scrotal skin.

SUMMARY AND CONCLUSIONS

It is suggested that, for coverage of a radiation ulcer directly over an important underlying structure, a pedicle flap, based at a distance and, if possible, carrying its own blood supply, be utilized.

A case is presented of a radiation ulcer of the perineal region, which exposed the posterior portion of the urethra and was covered by utilization of a posterior scrotal flap.

RÉSUMÉ ET CONCLUSIONS

Il est suggéré d'utiliser pour la réparation des ulcères par radiations immédiatement au-dessus d'une structure importante, un lambeau pédiculé prélevé à distance, ayant sa propre circulation sanguine.

Un cas d'ulcère par radiations de la région périnéale est présenté, qui a mis à nu la paroi postérieure de l'urèthre. Le recouvrement a été pratiqué au moyen d'un lambeau scrotal postérieur.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

Zur Deckung eines Bestrahlungsgeschwüres, das direkt über einem wichtigen Organ liegt, wird die Verwendung eines gestielten Lappens empfohlen, dessen Basis in einer gewissen Entfernung liegt und der, wenn möglich, seine eigene Blutzufuhr hat.

Es wird über den Fall eines Bestrahlungsgeschwüres in der Dammgegend berichtet, das den hinteren Abschnitt der Harnröhre freigelegt hatte und mit einem Lappen von der Hinterfläche des Hodensacks gedeckt wurde.

RIASSUNTO E CONCLUSIONI

E' noto che il metodo migliore per ricoprire le ulcerazioni da radiumterapia è rappresentato dal trapianto peduncolato con base lontana e nutrimento vasculare proprio.

Viene presentata una di queste ulcere nella regione perineale, che aveva scoperto l'uretra, e che fu riparata usano un lembo scrotale posteriore.

RESUMEN Y CONCLUSIONES

Los autores sugieren la utilización de un colgajo pediculado tomado a distancia y a poder se con propia irrigación sanguínea cuando se trata de cubrir una úlcera por radiación que asiente sobre una estructura importante.

Presentan un caso de úlcera por irradiación de la región perineal con exposición de la región posterior de la uretra y que fué cubierta utilizando un colgajo pediculado escrotal.

The lot of the patients in the insane asylums of the eighteenth century was dreadful beyond description. Exposed to the sadistic brutality of wardens recruited from the dregs of society and to the medical care of physicians who, lacking all understanding of the nature of their disease, subjected them—by way of therapy!—to incredible physical and mental torture, these unfortunates pined away their days manacled, beaten and starved, in punishment for deeds over which they had no control.

—*Farmer*

Industrial Injuries of the Foot

CHARLES F. STEISS, M.D., F.A.C.S., D.A.B.*

SAN FRANCISCO, CALIFORNIA

MOST of the complex injuries involving loss of tissue are seen at some time during their course by the plastic surgeon. In California, during 1956, the Department of Industrial Relations reported approximately 23,000 injuries involving the feet. Figures representing the extent of the disability involved are not available but could be expected to be staggering, since loss of time from work in this type of case is notoriously prolonged.

Surgeons are inclined to study and classify such cases according to the objective observations when the patient is first seen. This may be immediately or many months after the injury, and efforts are then directed towards salvaging what can be salvaged and replacing that which is lost to the best of their ability according to the general principles of reconstructive surgery. Their objective is a specialized one—to obtain healing and restore the foot as closely as possible to the normal from a purely surgical standpoint. Unfortunately, when the patient ultimately limps out of the hospital, his foot healed, the surgeon's enthusiasm is apt to drop off sharply, and he is inclined to divorce himself from further responsibility or active participation in the case, relying on the physiotherapist to carry on. The plastic surgeon, in order to do justice to himself and his specialty as well as to his patients, must not confine his interest to surgery alone; the much broader field of rehabilitation, which has been defined as a continuous therapeutic process that terminates only with recovery or successful reinstatement in some useful and economic occupation, is also his concern.

The condition of the foot may be vastly improved over that which was present prior to surgical treatment, but one must also compare this foot to the condition prior to *injury* before one can judge its potential from the standpoint of function. One may be inclined to presume, for exam-

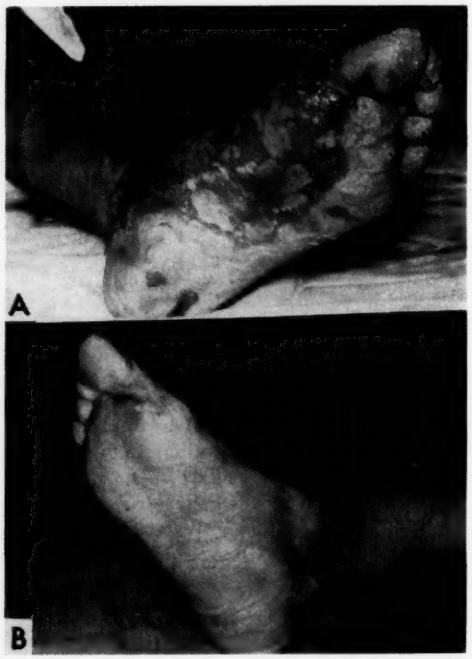

Fig. 1.—*A*, extensive third degree burn, showing some epithelial islands on plantar surface. Evidence of preexisting bunion. *B*, healed condition two years later. Good weight-bearing surface, minor contracture of great toe, painful callous at base of toe.

*Plastic surgeon, St. Mary's Hospital, San Francisco, California; attending plastic surgeon, U.S. Veterans' Hospital, Fort Miley, San Francisco, California; consultant in plastic surgery, Oak Knoll Naval Hospital, Oakland, California.

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Fig. 2.—Crossleg flap applied over achilles tendon. There is shortening of tendon following former chronic ulceration and infection.

ple, that the foot was normal at that time, which is very often, of course, not the case. Army surveys dealing with young adults disclose a multitude of foot disabilities, and the incidence of such problems is naturally much greater in the industrial age group ranging from the young adult to the worker in his sixties.

Many common chronic foot disabilities—weak or deformed feet, a shortened achilles tendon, previous trauma, inflammatory diseases of bones or joints, circulatory disturbances, congenital or developmental defects—will have a definite bearing on eventual rehabilitation. Over many working years any of these ailments may have become aggravated by occupation, poor posture, badly fitting shoes, obesity or a wide variety of other possible factors. The accident itself, plus prolonged bed rest, will have further altered the physiologic picture even in the normal foot.

The rehabilitation of each patient should be under the direct guidance and supervision of the surgeon who has had the opportunity of close association and study during the reconstructive phase of treatment, and is therefore in a position to know the patient and his problems better than does anyone else. The help and advice of specialists in this field is of

Fig. 3.—*A*, condition of feet when first seen after excision of painful callus and skin graft; total disability due to recurrent callosities. Congenital flat feet not a factor in original condition, which followed puncture wound. *B*, scar and callus replaced by skin of second toe—some return of callus, which is now improving with use of supports to protect this area from weight bearing.

course essential and invaluable, but indiscriminate physiotherapy can produce harmful results. Heat or massage, for example, may be highly beneficial if skillfully applied—reflex heat applied to the extremity, with resultant vasodilatation of the affected extremity, is capable of producing results not to be obtained by the application of direct heat, and avoids the inherent danger of a deep burn on a graft with impaired sensation. Whirlpool baths may stimulate healing, or retard it by maceration of the skin. Harm can be done by too vigorous massage in an attempt to loosen joints or overcome contractures; active rather than passive motion should be stressed.

By close supervision one may investigate and evaluate any complaint of pain early and thus avoid many of the complications that prolong disability—the pressure point that may lead to ulceration of the flap or the development of callus; the trigger point that may initiate causalgia; tender scars, which must be protected to avoid compensatory faulty weight bearing; contractures, which must be relieved.

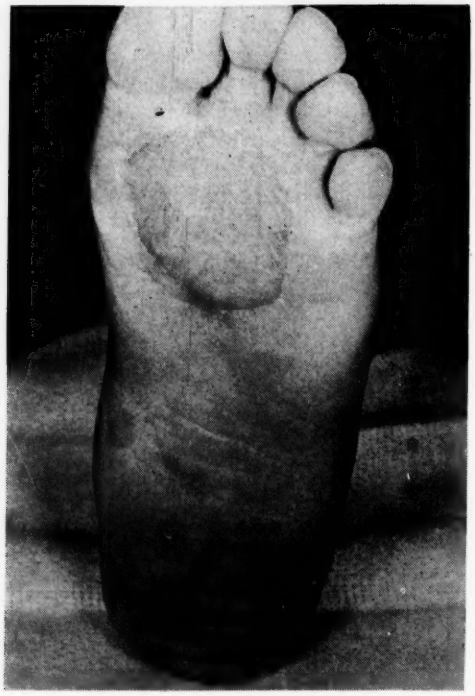

Fig. 4.—Flap that has proved satisfactory in covering an area of deep burn. Callus on great toe existed prior to the burn, owing to faulty footwear.

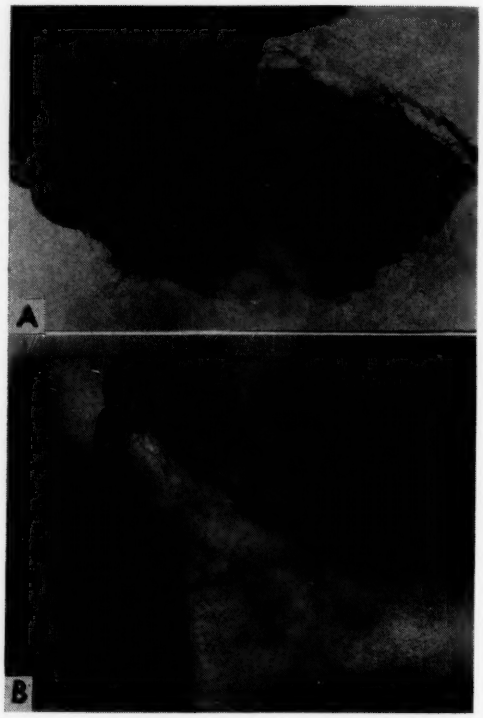

Fig. 5.—*A*, crossleg flap applied to medial aspect of foot after deep avulsion. *B*, weight-bearing areas not involved; patient, a man in his sixties, has returned to former occupation. Foot is not painful.

One must look at the whole man, not just at his feet; make him lose weight if he is too fat, improve his posture; evaluate and care for his general physical well-being, and, above all, offer encouragement and make him help himself. One must realize that a working man deprived of the ability to earn a living at the only

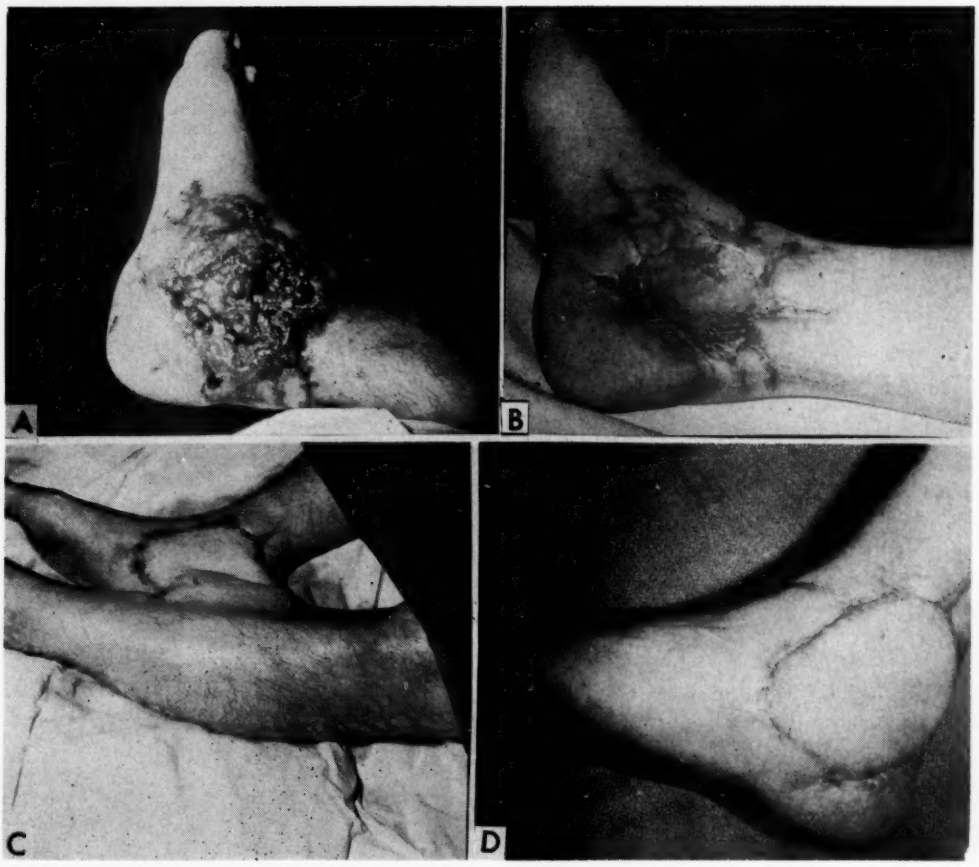

Fig. 6.—*A*, old avulsion wound with osteomyelitis involving ankle joint. *B*, healed wound but unstable ankle after soft tissue and bony débridement and skin grafting. *C*, crossleg flap in position, detached after twenty-one days. *D*, spontaneous arthrodesis eventually following flap transfer.

trade he knows is understandably depressed and worried about the future.

Eventually proper footwear must be provided, which will support and protect the injured part. Impressions of the foot are essential for accuracy in fitting. The method of obtaining impressions in grease, described by Robert Muller[1] in the *Archives of Physical Medicine and Rehabilitation*, seems to me most valuable, since it allows each metatarsal bone to seek its own level, depending on the weight it carries. Supports made in this manner have definite corrective value.

Unfortunately, when medical science has done its best and the patient has been dismissed from further treatment, in many cases the actual objective, reinstatement of the patient in some useful and rewarding occupation, has still not been achieved. An essential factor is missing—the coordination and cooperation between the medical profession and the employer. It has been definitely shown that the answer to the problem of rehabilitating the injured worker lies within industry itself. Par-

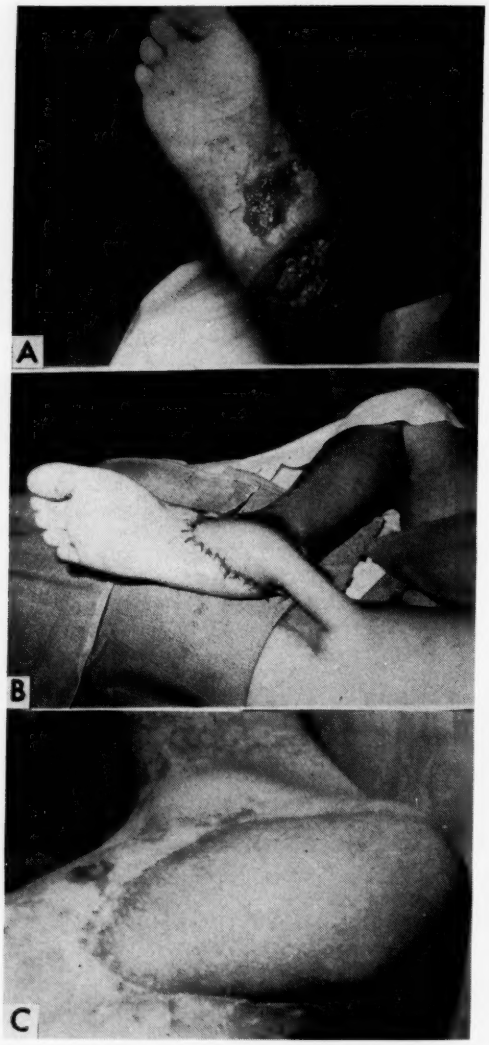

Fig. 7.—*A*, avulsion wound of heel; opposite leg amputated after accident. Patient 20 years of age. *B*, replacement of heel by thigh tube pedicle, since usual crossleg flap could not be employed. *C*, heel replaced by flap with good fat pad. Weight-bearing area must be well protected, especially because of opposite leg amputation and prosthesis. Vocational training, concurrent with physical therapy, was given.

ticularly in England, because of necessity brought on by acute manpower shortage, has the value of the handicapped worker been demonstrated. A paper by A. R. Thompson,[2] *The Industrial Approach to Medicine*, removes all doubt that therapy can be combined with productivity. Many large corporations in England include among their personnel 6 to 10 per cent of handicapped workers, with definite advantage to employer and worker alike. Some are temporarily disabled, producing as they heal; others have some form of permanent disability, and their jobs are assigned accordingly. All are gainfully employed, useful citizens. This is rehabilitation in its true sense.

There has been a beginning of such coordination in this country, but the stimulus of necessity is lacking; progress

Fig. 8.—*A*, avulsion wound not involving weight-bearing surfaces. Split thickness graft was first used, but, because of constant complaint of pain, pedicle flap was required later. *B*, crossleg flap employed with considerable relief in symptoms.

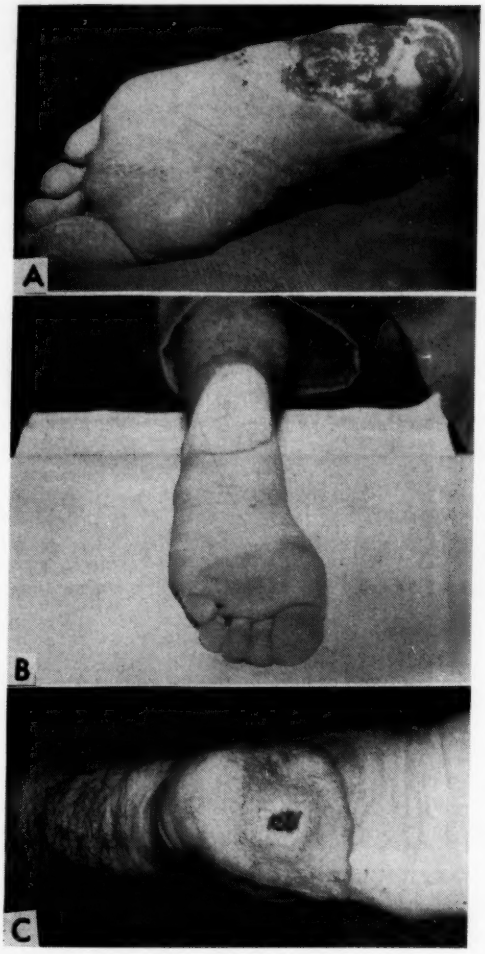

Fig. 9.—*A*, avulsion of heel in 20-year-old man. *B*, replacement by crossleg flap. *C*, ulceration in center of flap because of improper use of padding and failure of patient to use due caution.

is therefore slow, but could be accelerated by education and cooperation between medicine and industry, each having much to learn from the other.

SUMMARY

The author deplores a tendency on the part of plastic surgeons to dismiss the patient with an injured foot from his mind as well as from the hospital after the injury has healed. He emphasizes the fact that all plastic surgeons should familiarize themselves with the many aspects of the general field of rehabilitation. This is the more important because so many chronic ailments of the foot are involved in determining how well, and for how long, the patient will be able to function as an independent worker. The surgeon who has treated the injury, having had the opportunity of close association with the patient, is in a position to know the latter's problems and should keep in touch with him in order to check his progress and guard against unwise handling of any further difficulties that may arise. The theory that the "whole patient" deserves the surgeon's attention is nowhere more decidedly applicable than in the treatment of foot problems.

RESUMEN

El autor deplora la tendencia de parte de los cirujanos plásticos a desembarazar su hospital y su mente de los lesionados de los pies una vez que las heridas han curado. Estima importante que el cirujano plástico se familiarice con todas las facetas del campo general de la rehabilitación. Todo esto es muy importante ya que en los casos de molestias crónicas de los pies es preciso determinar en que forma y en cuanto tiempo el paciente estará capacitado para poder funcionar como un trabajador independiente. El médico que ha tratado la lesión, habiendo tenido la oportunidad del contacto íntimo con el lesionado está en posición de conocer sus problemas ulteriores y debe mantener esta posición para controlar el progreso y estar en guardia contra tratamientos inadecuados u otras dificultades que puedan surgir. La teoría de que todo lo del enfermo debe ser tenido en cuenta por el cirujano en ningún otro caso es más decididamente

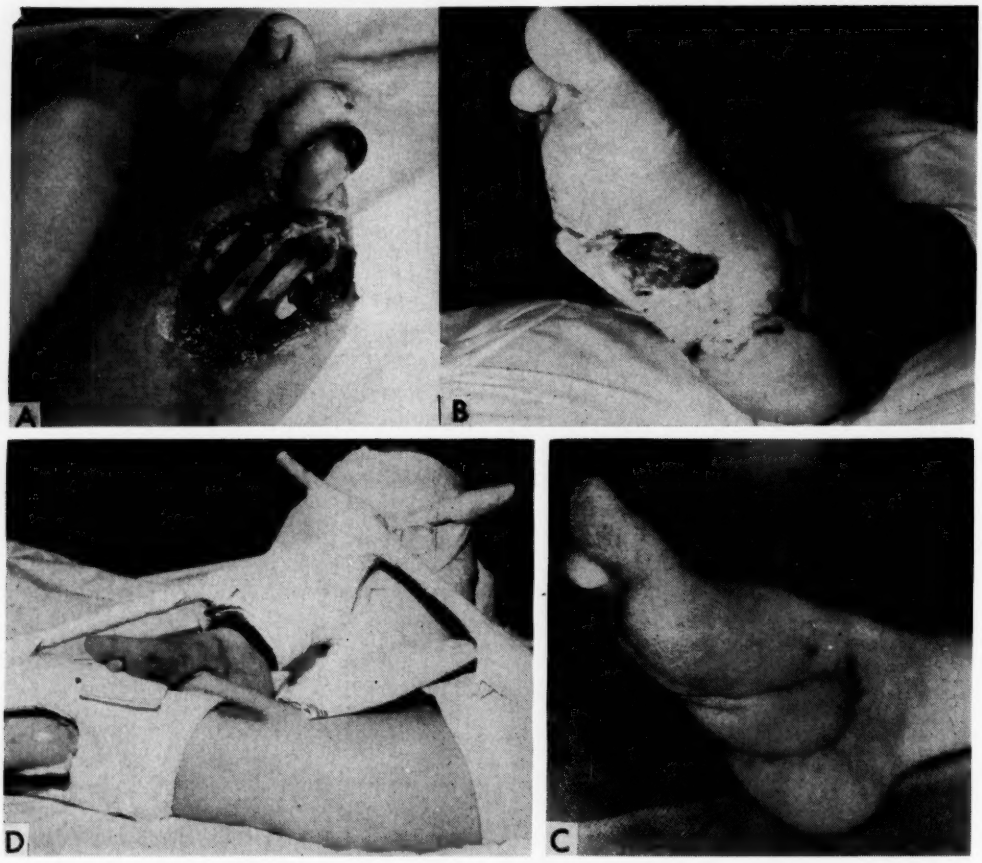

Fig. 10.—*Above, left and right,* extensive compound injury involving soft tissue and bone necrosis in 20-year-old man. *Below, left,* replacement of soft tissue after débridement of third, fourth and fifth metatarsals, with use of tube pedicle from thigh. *Below, right,* healed condition, with good weight-bearing surfaces. An accurate imprint was made of this foot, and suitable footwear was then specially prepared. Even with this amount of loss and deformity, function can be surprisingly good.

aplicable que en el tratamiento de las afecciones de los pies.

RIASSUNTO

L'autore condanna la tendenza di certi chirurgi plastici a trascurare completamente i malati con lesioni dei piedi, una volta che essi siano guariti e dimessi dall'ospedale, e raccomanda che ciascuno si faccia un'esperienza nel campo della riabilitazione. Ciò è sopratutto importante perchè non pochi disturbi cronici del piede sono decisamente determinanti sull'efficienza lavorativa di un uomo. E' il chirurgo che ha curato la lesione quello più in grado di entrare in una stretta collaborazione con il paziente, di conoscere i suoi problemi, di seguire il suo miglioramento e di consigliarlo se compaiano delle nuove diffcoltà. Il principio che il chirurgo deve occuparsi di "tutto il malato" vale per i

problemi legati alle lesioni del, piede più che in ogni altro campo.

RÉSUMÉ

L'auteur déplore la tendance des spécialistes de chirurgie plastique à considérer les cas atteints d'une lésion du pied comme guéris dès la cicatrisation de la plaie. Il devraient approfondir davantage les multiples aspects de la réhabilitation générale, aussi du point de vue de la capacité de travail. Le chirurgien ayant traité la lésion connaît les problèmes de son malade; il devrait continuer à la suivre afin de noter les progrès réalisés et de lui donner des conseils utiles. Le précepte selon lequel tout malade doit être considéré dans son entité est tout particulièrement valable lorsqu'il s'agit d'affections du pied.

ZUSAMMENFASSUNG

Der Verfasser beklagt die Neigung der Vertreter der plastischen Chirurgie, Patienten mit Fussverletzungen aus dem Krankenhaus zu entlassen und nicht weiter zu beobachten, nachdem die Verletzungen geheilt ist. Er fordert, dass die Kollegen aus der plastischen Chirurgie sich mit den vielfachen Problemen der Wiederherstellung der Arbeitsfähigkeit vertraut machen. Der Grad und die Dauer der Arbeitsfähigkeit wird durch viele chronische Fusserkrankungen erheblich beeinflusst. Der Chirurg, der die Fussverletzung behandelt hat, kennt den Kranken, ist mit dessen Problemen vertraut und sollte seine Fortschritte überwachen und ihn vor Unvorsichtigkeit und weiteren Schwierigkeiten bewahren. Nirgends ist die Forderung, dass der Chirurg den Gesamtzustand des Kranken überwachen muss, wichtiger als bei der Behandlung von Fussleiden.

REFERENCES

1. Müller, R.: The Arthritic Foot: A Method of Taking Weight Bearing Impressions for the Making of Supports, Arch. Phys. Med. & Rehabilitation 36:244, 1955.

2. Thompson, A. R.: The Industrial Approach to Medicine. The Medical Press, 1953, p. 578.

ADDITIONAL SOURCES

Morton, D. J.: Human Locomotion and Body Form. Baltimore: The Williams and Wilkins Company. 1952.

Plewes, L. W.; Barron, J. N.; Thompson, A. R., and Newell, H. H.: Rehabilitation in Industry, Lancet 2:699, 1948.

To someone who said he had no time, Sir James Paget (1814-1899), surgeon of St. Bartholomew's Hospital, London, replied: "You have all the time there is." Sir James left not only his mark but his name on the pages of medical history. Paget's test, Paget's disease of bone and Paget's disease of the nipple are terms in everyday use.

—*Hamilton Bailey, F.R.C.S. (Eng.), F.A.C.S. F.R.C.S. (Edin.), F.I.C.S. (Hon.)*

Editorial

Utilization of Composite Free Grafts

THE composite free graft provides a useful means of transferring small amounts of skin and subcutaneous tissue from one part of the body to another. The simplicity of the method, with minimal deformity of the donor site and without the necessity of the multiple stages required by flaps or tubes, recommends it for continued clinical use and further investigation.

The free composite graft consists essentially of skin and greater or less amounts of attached subcutaneous tissue. Brown and his associates[1] reported in 1946 an extensive series of these grafts, obtained from the ear, and consisting of a "sandwich" with skin on both sides and cartilage as the filling. Highly satisfactory repairs of the tip of the nose were described and illustrated.

In the same year, Dupertuis[2] described the use of similar "sandwiches" of skin and fat from the ear lobe, again using these grafts chiefly for repair of the tip of the nose. He cited Joseph as having used a section of normal nasal ala to correct a defect on the opposite side.

There are now numerous reports in the literature of the successful use of these grafts in repair of nasal tips, lower lids and ears.

In 1955, McLaughlin,[3] in an extremely interesting paper, described the use of composite grafts, differing with previous workers in that he used no dressings. He described early (within the first twenty-four hours) "pinking up" of the graft, followed by increasing evidence of venous congestion at about seventy-two hours, with a gradual change from then on to normal color. In his opinion, the early appearance of blood supply to the graft is due to the more or less accidental proximity of the cut ends of small vessels in the grafts and recipient areas. He cites Conway's work, which showed that true vessel union following the development of capillary buds does not occur until about the fifth day.

I wish to describe briefly the utilization of two donor areas as a source of composite grafts.

Occasional patients will be encountered who require repairs of the alae or columella and who for one reason or another cannot or will not supply ear lobe grafts. For such patients a satisfactory substitute can be provided by excising an ellipse of postauricular skin and subcutaneous tissue. This flat section is then simply folded on itself, providing the necessary section covered with skin on both surfaces and one edge, with a "filling" of fatty areolar tissue.

The second source of material is used

Read at the Twenty-Third Annual Congress of the United States and Canadian Sections, held in conjunction with the Eleventh Biennial International Congress, International College of Surgeons, Los Angeles, March 9-14, 1958.

Submitted for publication May 26, 1958.

1. Brown, J. B.; Cannon, B.; Fischer, C. E.; Davis, W. B.; Moore, A., and Murray, J.: Further Reports on Use of Composite Free Grafts of Skin and Cartilage from Ear, Plast. & Reconstr. Surg. 1:130, 1946.

2. Dupertuis, S. M.: Free Ear Lobe Grafts of Skin and Fat: Their Value in Reconstruction About the Nostril, Plast. & Reconstr. 1:135, 1946.

3. McLaughlin, C. R.: Composite Ear Grafts and Their Blood Supply, Brit. J. Plast. Surg. 7:274, 1955.

for repairs of fingers and feet. Some years ago I began using Wolf grafts from the patellar and elbow areas, on the erroneous assumption that this skin would form normal callus. This did not occur, but the grafts wore exceedingly well, apparently because of the great elasticity of the skin from these sites. Recently these grafts have been taken to include the slippery underlying areolar tissues in a thickness at least equal to that of the overlying skin. Such grafts have been especially satisfactory in restoring padding to fingertips.

In general, I agree with other workers that gentle handling and careful hemostasis are essential. As to size, a good general rule is that no part of the graft should be much more than 1 cm. from a free edge. It is my impression that the most important factor in a successful take is an accurate fit of the dermis of the graft to the dermis of the recipient site, this fit being maintained by meticulous sutures of very fine material. Usually small dressings are tied into place with gentle pressure, but the possibility of using no dressing is certainly tempting and will probably be explored in the near future.

—Monroe K. Ruch,
M.D., F.A.C.S., D.A.B.
Los Angeles, California

Sir George Buckston Browne, 1818-1945, was the first surgeon in England to open the bladder and remove a papilloma. Buckston Browne, who had one of the largest, if not the largest, urologic practice ever known in this capital city, had no hospital appointment and no higher qualification in surgery. Early in his career he presented himself for the examination of the Royal College of Surgeons on numerous occasions, and always failed. His failure to obtain this qualification debarred him from gaining an appointment on the staff of a hospital. Never before, and never since, has a surgeon prospered in London without a hospital appointment or the Fellowship of the Royal College of Surgeons. In the evening of his long life he was made an Honorary Fellow of the Royal College, and in gratitude for the honor bestowed upon him he made magnificent gifts to the College and founded the Buckston Browne Research Farm at Downe, Kent. Down House was the home of Charles Darwin, the pioneer of the theory of evolution.

—Hamilton Bailey, F.R.C.S. (Eng.), F.A.C.S. F.R.C.S. (Edin.), F.I.C.S. (Hon.)

New Books

BOOKS RECEIVED

The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

Operative Surgery. Edited by Charles Rob and Rodney Smith. London: Butterworth & Co., Ltd.; Philadelphia, F. A. Davis Co., 1956. Vols. 1 and 2 of 8 (plus index). Profusely illustrated.

Proceedings of the Third National Cancer Conference, Detroit, Michigan, June 4-6, 1956. Sponsored by the American Cancer Society, Inc., and National Cancer Institute, U. S. Public Health Service. Philadelphia: The J. B. Lippincott Company, 1957. Pp. 961.

Le Diagnostic du Cancer d'Estomac a la Periode Utile (Diagnosis of Carcinoma of the Stomach at the Time Most Favorable for Treatment). By Rene A. Gutmann. Paris: G. Doin et Cie, 1956. Pp. 257.

Pathology and Surgery of the Veins of the Lower Limbs. By Harold Dodd and Frank Cockett. Baltimore: The Williams & Wilkins Company, 1957. Pp. 462, illustrated.

Spinal Cord Compression. By I. M. Tarlov. Springfield, Ill.: Charles C Thomas, Publisher, 1957. Pp. 147, with 41 illustrations.

Functional Bracing of the Upper Extremities. By Miles H. Anderson. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 463. Illustrated.

Bases Physio-Biologiques et Principes Généraux de Réanimation (Basic Physiobiologic and General Principles of Reanimation). Laborit, H., Cara, M., Jouasset, D., Duchesne, G., and Laborit, G. Paris: Masson & Cie, 1958. Pp. 273, with 61 illustrations. *Reviewed in this issue.*

Experimental Surgical Studies. By W. J. **Dempster.** Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 463, with 63 illustrations. *Reviewed in this issue.*

Extracorporeal Circulation. Compiled and edited by J. Garrot Allen, with the assistance of Francis D. Moore, Andrew G. Morrow and Henry Swan II. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 518, with 190 illustrations. *Reviewed in this issue.*

The Postoperative Chest: Radiographic Considerations After Thoracic Surgery. By Hiram T. Langston, Anton M. Pantone and Myron Melamed. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 223, with 80 illustrations. *Reviewed in this issue.*

The Treatment of Fractures. By Lorenz Böhler. New York and London: Grune & Stratton, 1958. Pp. 2,307, with 1,699 illustrations. *Reviewed in this issue.*

The Clinical Management of Varicose Veins. By David Woolfolk Barrow. New York: Paul B. Hoeber, 1957. Pp. 167, with 70 illustrations.

The Story Behind the Word: Some Interesting Origins of Medical Terms. By Harry Wain. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 342.

Homosexuality, Transvestism and Change of Sex. By Eugene de Savitsch. London: William Heinemann Medical Books Ltd., 1958. Pp. 120.

The Treatment of Fractures. By Lorenz Böhler. New York and London: Grune & Stratton, 1958. Pp. 2,307, with 1,699 illustrations.

This is the third of a series of books which, when completed, will make up a detailed compendium that might be entitled "Encyclopedia of Fracture Therapy." Volume 3 was translated from the thirteenth German edition by Alfred Wallner, M.D., Diplomate abd Otto Russe. It deals exclusively with injuries of the knee joint, the lower part of the leg and the foot. In his discussion of injuries of the knee the author has included injuries to the extensor mechanism of the knee, traumatic dislocation of the patella, dislocation of the knee joint, bruises and contusions of the knee joint, injuries to the ligaments and internal derangements of the knee joint. In a similarly thorough and detailed coverage of each subject he has dealt with fractures and other injuries of the tibia and fibula, the ankle joint, and the bones and ligaments of the foot. Noteworthy in this reference book is the importance of gunshot wounds of the knee and ankle, the bones of the leg and the foot, and the emphasis placed thereon.

It is probable that no one living today has had as extensive experience in the definitive treatment of war injuries, including gunshot wounds of the extremities, as has Lorenz Böhler.

EDWARD L. COMPERE, M.D.

Bases Physio-Biologiques et Principes Généraux de Réanimation (Basic Physiobiologic and General Principles of Reanimation). Laborit, H., Cara, M., Jouasset, D., Duchesne, G., and Laborit, G. Paris: Masson & Cie, 1958. Pp. 273, with 61 illustrations.

This treatise is a continuation of the authors' previous work "Artificial Hibernation in Surgery and Medicine" (*"Pratique de l'hibernothérapie en Chirurgie et en Médecine"*), published in 1954. The first volume dealt with pharmacotherapeutic methods of inducing hibernation, and the present volume incorporates new ideas in a general concept, in which the biologic, hormonal and physical are linked with pharmacologic measures.

There are sixteen chapters. The first pertains to generalities. The authors point out that progress in this field of surgery is due to increasingly precise knowledge of the mechanisms that control cells, tissues and organic life, and that these should be adapted and made use of in physiology, biology and pharmacology.

Chapter 2 deals with cellular phenomena—the organic reaction to aggression that is controlled by intercellular, interstitial and interorganic systems of coordination, viz., the nervous, endocrine and vascular systems. Cellular bioelectrogenesis taking place in aggression is minutely described and graphically portrayed.

Chapter 3 deals with the organic reaction to aggression, the lack of correlation of individual cells bathed in nutritive liquid and the rôle of the arteriocapillary system in the reaction of plasma and interstitial tissue. Syndromes due to lesions and to reaction are also described.

Chapter 4 explains the regulation of hydroelectric balance. In a complex organism there is correlation among cells—the vascular, endocrine and vegetative nervous systems that control the reaction to aggression.

Chapter 5 discusses the regulation of acid-base balance. The importance of control of the movements of hydrogen ion is stressed; the transmembranous exchange of sodium and calcium is explained; the mechanism of respiratory and renal control of the hydrogen ion is presented, as are problems of acidosis and alkalosis.

Chapter 6 deals with methods of investigation of ionic and metabolic phenomena—water and electrolyte balance, determination of blood and urine urea, etc. Curves depicting the intensity and duration of neuromuscular excitability are presented. Also noted are neuromuscular excitability, intracellular and

extracellular ionic charges and metabolic cellular variations. The authors point out the importance of determining the consumption of oxygen and the clinical signs of aggression.

In Chapter 7, Dr. Laborit describes his methods of investigating respiratory function, spirography, etc.

In this same chapter Drs. Cara and Jouasset discuss respiratory and cardiac reanimation. The various methods of artificial respiration and resuscitation are discussed in detail. They include artificial expectoration, tracheobronchial aspiration, tracheal intubation, etc. Exploration of the kidney and renal reanimation are described. The prophylaxis and treatment of cardiac reanimation are discussed. It is interesting to note that ten years ago the authors abandoned the use of vasopressors, cardiac tonics and derivatives of camphor and have noted no increase in mortality and morbidity rates.

Dr. Duchesne devotes Chapter 8 to principles of dietetics. He points out that in order to carry out efficaciously the reanimation of the operatively treated, wounded or gravely ill patient, all possible nutritional precautions must be taken.

Chapter 9 points out that anesthesia and operative intervention immediately produce dangerous respiratory and cardiac reflexes. In the majority of cases it is possible to maintain a cellular mechanism effective enough to reassure re-equilibration of the patient's physiobiologic functions. The effect of hibernation on the various systems is described.

Chapter 10 deals with the advantages of lowering metabolic activities to protect the organism during aggression. This includes antihypermetabolizing and hypometabolizing mechanisms and the use of metabolic depressants, etc.

Chapter 11 is an extensive physiologic study of artificial hibernation and neuroplegia. This includes the rôle of the cardiovascular, respiratory and endocrine systems, as well as dextrose, lipid and protein metabolism. The action of the neuroplegic agents on the source of caloric energy, electrolyte balance, and lesions of the liver biliary tract due to shock and anoxia is considered, as are the effects on the kidneys, nervous system, cicatrization, etc.

Chapter 12 is concerned with shock, transitory collapse, shock syndrome and mechanisms of physiologic autoregulation. The authors describe the treatment for the group of physiopathologic changes at the cellular and cardiovascular levels, etc.

Chapter 13 deals with hyperthermy and deep hypothermy. Postoperative hyperthermy—disturbance of intercellular correlation of vasomotor, vegetative and endocrine reactions—in which more energy is liberated, is discussed. Prophylaxis and treatment are outlined. The technique of deep hypothermy is described, as well as experiments on the reduction of sodium reserve and enrichment of potassium in the cells, oxygen consumption, effect on the heart, blood pressure, etc. They conclude that one encounters the same problem as in hypothermy. It concerns the control of liberation of hydrogen ions by the cells whose metabolism is reduced as well as its excretion by the lungs. All change toward acidosis or alkalosis engenders electrolyte problems and cellular dysfunction, of which the heart is the first to suffer the consequences.

Chapter 14 discusses problems posed by senescence. Chapter 15 deals with pain. Chapter 16, headed "Conclusions," is a long and detailed discussion.

The authors state that they were the first to demonstrate the relation of artificial hibernation to general pathologic conditions; it was formerly limited to certain fields in medicine and surgery. They cite general principles of reanimation, the basic physiologic reaction of the body against aggression after anesthesia, operation, trauma or grave illness. They stress the importance of drugs as an aid in inhibiting more or less severe reactions to aggression by the lowering of the metabolism, and employ derivatives of phenothiazine, meperidine hydrochloride and "cocktails lytique." In the past the authors preferred and advised use of moderate artificial hibernation only, but recent research on deep artificial hibernation has enabled them to evaluate it more accurately.

Physiologists, neurologists and internists, as well as surgeons, may well profit from reading this complete work on reanimation.

CHARLES PIERRE MATHÉ, M.D.

Experimental Surgical Studies. By W. J. Dempster. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 463, with 63 illustrations.

This well-written book is meant for the postgraduate surgical student interested in experimental surgery. It is formulated to be a guide to experimental surgery, for it does not describe a procedure in detail but rather sets forth the principles of the procedure. It is especially well documented, again with the idea of being a guide to the literature of experimental surgery. The author's starting point is the clinical problem, and throughout the book he correlates the work of the clinician and the animal experimentalist. Much of the text concerns the problems of tissue regeneration, transplantation and implantation. This book can be recommended to those interested in experimental surgery.

PHILIP THOREK, M.D.

Extracorporeal Circulation. Compiled and edited by J. Garrot Allen, with the assistance of Francis D. Moore, Andrew G. Morrow and Henry Swan II. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 518, with 190 illustrations.

The technic of extracorporeal circulation for open operations on the heart is being used with increasing frequency, although its use upon the human patient has become practical only within the past two years. Extracorporeal circulation was developed by pioneers working in divers laboratories throughout the United States and abroad; it is understandable and to be expected, therefore, that a multiformity of methods has appeared. Efforts continue to refine each system, to modify and adopt what is superior in some schemes and to discard what is undesirable in others.

Much of the financial support for research has been contributed by the United States Public Health Service. In September 1957, this body convened in a meeting to include all investigators who have made contributions in this field, and this book brings together the papers, discussions and ideas presented at that conference.

The material is divided into four sections, the first of which deals with pumps and oxygenators. Pumps are considered first as to the desired ideal and are categorized into continuous and pulsatile types. Various individual pumps are discussed. Oxygenators are considered and the modifications of the four common types presented, namely: disc film, bubble, screen and membrane oxygenators. The second section deals with the physiologic aspects of body perfusion and the problems and data pertaining to the following topics are discussed: optimum flow rates, flow meters, alteration in acid-base balance and hypothermia in relation to flow rates. Section 3 presents the effects of perfusion on various organs, with the exception of the heart. The latter is taken up in the last section and includes consideration of cardiac metabolism, coronary blood flow, elective cardiac arrest and experience with specific operative procedures.

The need for a common terminology and a standardization of points of reference was realized, and the appendix, a most important chapter, is the work of a committee appointed to codify and define terms, expressions, methods of comparison, terms of measurement and standards of performance.

Unquestionably this book, like any book on a subject that is in the flood-tide of rapid development, will soon be outdated by the swift changes of progress. It serves an important function, however, in grouping under one cover the ideas expressed in numerous scattered publications, thus vouchsafing the reader a moment's respite in which to survey the field in perspective, to assimilate the advances thus far made and perhaps, too, to look forward in prescience to the future.

S. A. MACKLER, M.D.

The Postoperative Chest: Radiographic Considerations After Thoracic Surgery. By Hiram T. Langston, Anton M. Pantone and Myron Melamed. Springfield, Ill.: Charles C Thomas, Publisher, 1958. Pp. 223, with 80 illustrations.

The purpose of this monograph is to codify the postoperative roentgen appearance of the thorax. Whereas appraisal of shadows in the surgically undisturbed chest may be accom-

plished with perspicacity because the position of normal anatomic shadows is basic as a "constant," such a standard is lacking for the postoperative thorax, and interpretation becomes complex because of surgical alteration of the basic anatomy.

The presentation is in atlas form, and the roentgen appearance of surgical alteration of tissue is demonstrated and interpreted. This is done by means of reproductions of roentgen films, accompanied by line drawings for identification of specific shadows requiring interpretation. The presentation is made in a uniform manner, according to a classification arranged by the author.

A variety of thoracic surgical procedures is accounted for, with the postoperative roentgen films reproduced. Sequences are presented demonstrating changes in the film concomitant with the lapse of time. Complementing the illustrations of the "expected" postoperative change, there also appear roentgen reproductions of unexpected postoperative complications.

The book helps in supplying an answer to the question of what is the "normal" or expected roentgen change that follows a thoracic operation. Although the interpretation of surgically altered features is best accomplished by one who actually makes such alterations, i.e., the surgeon, this atlas of roentgen reproductions makes available to those not able to be present at operation a guide to "expected" postoperative deviations in the roentgen film.

S. A. MACKLER, M.D.

Surgery began as a handicraft. In ancient times it was conducted by journeymen who plied their simple trade, often coupled with that of the barber, at fairs and inns. Gradually, through the vision and by the labours of a series of guilds and corporations . . . it was elevated from a humble craft to a science and an art. Within the last few years British surgery has attained a level higher than it has ever reached before; we have hitched our wagon to a star; let us see that the wheels are well planted on the road.

I speak of the craft of surgery, for the word craft retains unsullied its honourable tradition of sound work well done, whereas the word 'art' is dragged down under the weight of those who claim its appellation. The hairdresser, the crooner, the juggler, the Hollywood extra, are all artists, whereas the watchmaker, the plumber, the smith, the carpenter, and the shipwright are proud to remain craftsmen. A surgeon, like a shipwright, must consider the design and purpose of the task he is about to undertake, his materials, his tools, the arrangement of his workshop, and the training of his assistants.

—Ogilvie

Abstracts from Current Literature

A Technic for Obstetric Anesthesia in a Small Military Hospital. Saber, R. H., USAF (MC), and Covalesky, B., USAF (Captain M.C.), Military Med. 122:413 (June) 1958.

The method described should be as useful in civilian practice as it has been in military service, where it solved the problem of establishing a standard procedure for obstetric anesthesia. The technic proved to be easily mastered and quite feasible for routine use in a small hospital with a rapid turnover of medical personnel of varied training and schooling or with recent completion of internship. It consisted in pudendal nerve block prior and supplemental to nitrous oxide-oxygen (3:1 or 2:1 liters per minute) inhalation anesthesia.

Fifty-four consecutive uncomplicated vaginal deliveries were accomplished by this method. All patients had visited the prenatal clinic, and none was known to suffer from any drug allergy or idiosyncrasy. No patient had taken food less than four hours before delivery. The following routine procedure was used: Time permitting, a preanesthetic sedative was given. When less than an hour remained ante partum, this was omitted. The patients were informed of the method to follow. A pudendal nerve block was made either transvaginally or, if the fetal head had descended too far, through a perineal skin wheal. Chloroprocaine hydrochloride (Nesacaine 2 per cent) was used. It was rapid-acting and potent, and it provided prolonged effective anesthesia without side effects. Because of its intense action, only 4 to 6 cc. of nesacaine were required instead of the usual 30 cc. of other common local agents, e.g., procaine hydrochloride. On completion of the nerve block, nitrous oxide-oxygen was given by inhalation.

The disadvantages of inducing general anesthesia *first* are: (1) the patient usually bears down with uterine contractions, especially after intravaginal manipulation; (2) higher concentrations of nitrous oxide are necessary; (3) it is difficult to determine the effectiveness of the nerve block, and (4) untoward drug reactions are more difficult to recognize.

The advantage of administering the nerve block first is that higher oxygen concentrations may be used with nitrous oxide, as an added prophylactic measure against maternal and fetal hypoxia. Shortly before delivery, 100 per cent oxygen should be administered whenever possible.

In the authors' series no fetal depression or hypoxia occurred. Fourteen primiparae and 40 multiparae were delivered by 5 medical officers, only 1 of whom had formal training in obstetrics. Fourteen multiparae and 2 primiparae were given only pudendal nerve block. Four multiparae were given no anesthetic, because of imminent delivery. Episiotomy was performed in all cases except those of 8 multiparae. After the second stage of labor, inhalation anesthesia was discontinued and the episiotomy repaired under the prolonged anesthetic effect of the pudendal block. An outlet forceps was used to deliver 8 primiparae and 12 multiparae. In all forceps cases inhalation anesthesia was used in addition to nerve block.

The authors' method is simple and provides an increased margin of anesthetic safety during delivery.

ERNEST G. ABRAHAM, M.D.

Current Status of Therapy in Peptic Ulcer. Kirsner, J. B., J.A.M.A. 166:1727, 1958.

Despite the limitations of medical management, current methods of treatment, when applied properly, are effective in the vast majority of cases of uncomplicated peptic ulcer. Treatment should not be confined to a single therapeutic measure. The emphasis should be on total management, including the use of antacids, anticholinergic drugs and sedatives, the avoidance of gastrointestinal irritants, and skillful attention to emotional problems. Inadequate results are usually attributable to inadequate therapy. The fact that treatment is more or less nonspecific does not justify its casual and indifferent application. The continued study of hormonal factors, of

drugs acting upon enzyme systems implicated in the process of gastric secretion, and of secretory inhibitors in the gastric content eventually may yield a medical technic for producing sustained gastric antacidity. Obviously, the cure of peptic ulcer will depend upon further knowledge of its pathogenesis, especially the nature of tissue resistance and the mechanism of secretion of hydrochloric acid.

Currently available drugs are evaluated.

WILLIAM E. NORTH, M.D.

Lymphoid Polyps (Benign Lymphoma) of the Rectum and Anus. Holtz, F., and Schmidt, L. A., Surg., Gynec. & Obst. **106**:639, 1958.

So-called benign lymphoma of the rectum is an uncommon, usually solitary polypoid lesion of the lower part of the rectum or the anus, composed of lymphoid follicles limited to the mucosa and submucosa. The pathogenesis has not been determined and the chief importance of the condition is that it may be diagnosed erroneously as malignant lymphoma. In the literature some cures of malignant lymphoma primary in the rectum are reported.

In the authors' series, the microscopic features included hyperplastic lymphoid follicles with prominent germinal centers in the mucosa and submucosa of the anus or rectum. There was no encapsulation of the lymphoid foci, and the follicles were separated by strands of reticulin. Frequently the follicles encroached upon the muscularis mucosae, and atrophy of the overlying mucosa was common; invasion of the muscularis propia, however, did not occur. Mitotic figures were frequent in the germinal centers but were not observed elsewhere. Phagocytosis by cells of the germinal centers was noted frequently and resembled that observed in tonsils. In 2 instances the polyps were covered in part by squamous epithelium.

In contrast, the malignant lymphoblastoma primary in the rectum showed a complete loss of follicular architecture except for a few persistent follicles in 2 cases of tumor designated as giant follicular lymphoma. With the malignant lymphoblastomas, invasion of the underlying muscularis propria was common and involvement of regional lymph nodes frequent. Mitotic figures were scattered throughout the areas of lymphoid infiltration, and phagocytes were not noted in any of the 7 malignant lymphoblastomas primary in the rectum.

A histologic study of 24 cases of lymphoid polyps resulted in the conclusion that these lesions are the result of chronic inflammation, possibly at the sites of minor anatomic abnormalities. The benign nature was confirmed by follow-up studies in 21 of the 24 cases.

The term "lymphoid polyp" may be preferable to the term "benign lymphoma."

WILLIAM E. NORTH, M.D.

Cytochemical Studies of Prostatic Epithelium. Persky, L., and Leuchtenberger, C., J. Urol. **78**:788, 1957.

The authors of this paper have investigated the desoxyribose nucleic (DNA) content of prostatic cells, the better to differentiate benign from malignant cells of the prostate. Normal cells have a characteristic constant amount of DNA, whereas the ribose nucleic acid (RNA) varies in amount.

Forty patients, were examined; 13 with benign enlargements, 25 with malignant tumors of the prostate and 2 normal.

The 15 patients with benign enlargements showed the constant amount of DNA found in all other normal tissues. The mean DNA values in the cases of malignant disease showed a higher value, and the distribution curve of the graphic representation showed wider scatter of the individual cell DNA values, indicating a buildup of DNA in individual nuclei preparing for mitotic activity.

These data have significance in that another criterion is added to the armamentarium of the pathologist who must differentiate the benign from the malignant prostate. They will be helpful to the urologist in determining whether a conservative or a radical operation should be performed on the prostate.

SHEPARD JEROME, M.D.

Pancreatitis. Bell, E. T., Surgery **43**:527, 1958.

One hundred and seventy-nine cases of fatal pancreatitis are reported.. The incidence of necropsy among subjects over 20 years of age

was 0.25 per cent for men and 0.36 per cent for women. The ratio of women to men with pancreatitis is about 3:2. In this series the disease developed after the age of 40 in 74 per cent of the men and 84 per cent of the women. The gross changes noted in the pancreas at necropsy were similar for the acute and the chronic condition, except that 20 per cent of the patients with the chronic condition showed fibrosis, calcification or pseudocysts.

The role of cholelithiasis in pancreatitis cannot be appreciated unless the cases are studied with respect to age and sex. The excess of cholelithiasis above its expected incidence in persons with pancreatitis suggests that gallstones are the cause of pancreatitis in about one-third of men and one-half of women over 40 years of age. Gallstones are not an important factor in the causation of pancreatitis in persons under 40.

Alcoholism is a more important etiologic factor than cholelithiasis in subjects under 40. Thirteen of the author's 32 subjects with pancreatitis in this age group were chronically alcoholic, while only 6 had gallstones. In the literature 20 to 30 per cent of pancreatitis is attributed to alcoholism.

Lithiasis is usually a late complication of chronic pancreatitis, but it may develop without signs of pancreatitis.

Glycosuria is not often present in cases of mild pancreatitis but is usually present in the later stages of the severe type. Hyperglycemia of some degree is usually present in all cases of severe pancreatitis.

Typical diabetes of short duration often develops in subjects who die several weeks after the onset of an acute attack. Permanent diabetes finally develops in about 14 per cent of subjects with chronic pancreatitis without lithiasis and in about 45 per cent of those with lithiasis. Acute pancreatitis may develop in a diabetic patient. Only a small percentage of clinical diabetes is due to pancreatitis, 0.38 per cent in the author's necropsies. Diabetes due to pancreatitis differs from idiopathic diabetes in the absence of vascular disease.

WILLIAM E. NORTH, M.D.

Hippocrates was familiar with the following phenomenon. "Paralysis appears on the left side, when injury to the head is on the right side, in contrast the paralysis is rightsided when injury is on the left side." This observation is often ascribed to Paracelsus.

—Major

In the Hunterian Museum of the Royal College of Surgeons, 13,682 specimens were left by one man alone—John Hunter (1728-1793), Surgeon, St. George's Hospital, London.

—Hamilton Bailey, F.R.C.S. (Eng.), F.A.C.S., F.R.C.S. (Edin.), F.I.C.S. (Hon.)

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